Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

In this issue—

- Dungeness Crab Pots — P. 3
- Scallop Dredge — P. 3
- Fish Stick Quality — P. 13
- Freeze-Dried Shrimp — P. 17
- Seaweed Colloids — P. 21

—and 43 others

MAR 1957
LIBRARY
POFI
FISH & WILDLIFE
SERVICE

Vol. 10 No. 2 February 1957

Fish and Wildlife Service
U. S. Department of the Interior
Washington D. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FRED A. SEATON, Secretary

FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS
A. W. ANDERSON, Chief, Branch of Commercial Fisheries
DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR
MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS
KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle
F. BRUCE SANFORD, Chemist, Seattle

Applications for COMMERCIAL FISHERIES ABSTRACTS, which is mailed free to members of the fishery industries and allied interests, should be addressed to the Director, Fish and Wildlife Service, United States Department of the Interior, Washington, 25, D.C.

Fulfillment of foreign requests confined to Government agencies, research institutions, and libraries.

The Service assumes no responsibility for the accuracy of material from outside sources, and can fulfill requests for copies of the articles only if the abstract was taken from a Service publication. Readers should direct requests for other articles to the author of the article or to the publication in which it appeared. The addresses of these publications are available from the Fish and Wildlife Service, Washington 25, D. C., and will be sent to inquirers upon request.

The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.112 QUALITY CONTROL FOR THE CANNER AND FREEZER - BASIC PRINCIPLES AND INSTRUMENTATION. PART I.

Kramer, Amihud and Twigg, Bernard A.
The Canner and Freezer 123, 16-19, 37 (July 23, 1956)

The overall quality of a food may be defined as the total characteristics of the food that influences consumer acceptance. The factors involved in quality evaluation of foods may be classified into three positive categories--appearance, flavor, and texture; and three negative categories--nutrient loss, freedom from toxic residues, and freedom from foreign substances. One or more of these may be important in any specific instance.

Appearance factors.--Appearance is determined by size, shape, pattern, wholeness, color, and gloss. Of these, color and gloss are the most difficult to measure.

Measuring color and gloss.--Several instruments are available for objectively measuring color and gloss. Applying these to food is still in the developmental stage. Two main areas of research have been started. These are (a) correlation of color specifications to consumer preference, and (b) development of the simplest procedures and instrumentation.

Definition of color.--Physically, color is a characteristic of light, measurable in terms of intensity and wave length. It arises from the presence of light in greater intensities at some wave lengths. Psychologically, color is further limited to the band of the spectrum from 380 to 770 mμ (millimicrons). Light is the radiant energy of which the human eye is aware through the visual sensation.

Light source.--Color perception is dependent upon the light source. Colors appear to change

(over)

 ABSTRACTER: Richard W. Nelson

1.95 TECHNOLOGICAL STUDIES ON THE PROCESSING OF SEA LIONS

Kyte, Robert M. (Fishery Products Laboratory, Ketchikan, Alaska)
Commercial Fisheries Review 18, 1-7 (June 1956)

Sea lions are predators on the commercial fisheries of Alaska causing continuing financial loss and annoyance to the fisherman. A good way to control a predator is to find a commercial use for it. Investigation indicated a number of small sea-lion rookeries in southeastern Alaska within one day's run of existing cold-storage and reduction plant facilities. Under certain conditions the handling of sea lions by these plants might be attractive.

Seven sea lions were caught near Ketchikan, Alaska, in December 1955, and January 1956. From these animals the yields of meat, liver, blubber, and hide were determined and the proximate composition of an immature animal and a nursing cow were calculated. The oil rendered from sea-lions was found to be similar in chemical composition to fur-seal oil, an oil which usually follows the market price of fish oils, but in some years brings a premium over fish oils.

The meat from sea lions comprises about one-third of the carcass weight and might find a market in fur-animal or fish-hatchery feeding, competing with whale and horse meat. No commercial use has yet been found for the hide.

Table 2 - Proximate Composition of Meals Prepared from Sea Lions

Type of Meal	Moisture	Oil	Protein	Ash
	(Percent)			
Liver meal	12.8	19.7	51.1	5.2
Viscera meal	8.0	20.2	70.2	2.9
Bone meal	5.2	27.6	44.7	22.3
Meat meal	5.9	27.0	58.9	3.9

Note: The analyses account for only 88.8 percent of the liver meal and 95.7 percent of the meat meal. Glycogen and other carbohydrates perhaps account for the balance.

(over)

 ABSTRACTER: Robert M. Kyte

1.85 B. C. SHRIMP FISHERY

Anonymous
Trade News 8, 3-4 (June 1956)

Passengers on ships entering or leaving the harbor of Vancouver, B. C. can often see from 10 to 15 shrimp boats in operation just off the mouth of the Fraser River.

Fishing for shrimps in British Columbia is usually a one-man operation. Most of the craft used for shrimping are salmon gill-net boats rigged for trawling. They trawl for shrimp during the winter and early spring and are re-converted for salmon when those fish are running. The drum in the stern of the boat, which in salmon fishing is used to haul the net, serves as a winch to reel in the tow line of the shrimp trawl.

The shrimp trawl is made of small mesh net, is about 15 feet wide at the mouth, and tapers to a "cod end". In operation, the mouth of the trawl is kept open by a wooden beam fastened laterally to the net. A ground line of rope weighted with chain or some other heavy material keeps the bottom of the net just above the floor of the sea, whereas glass floats secured to the upper part of the trawl mouth keep that part above and forward of the ground line.

The shrimps on the bottom, disturbed by the approaching ground line, rise in small clouds and, because the upper part of the trawl is forward of the ground line, they rise into the net and are caught in the cod end.

A "drag" may last from one to four hours. An experienced shrimper can get some idea of the size of his catch by testing the resistance of his trawl. When he is ready to haul in the net, the fisherman

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.1121 FISHING METHODS AND GEAR - DRAG NETS - MISCELLANEOUS TRAWLS

Manacop, R. and Capco, R.
The Philippine Journal of Fisheries 2, 25 pp. (July-December 1953)
World Fisheries Abstracts 7, 21 (July-August 1956)

A demersal fishery, mainly for white goby (Glossogobius giurus) became established in a large fresh water lake with the postwar evolution of a dredge trawl gear used for catching bottom spp. The lake is shallow, flat and muddy with an average trawlable depth of 3 m. (9.8 ft.) The ordinary fishingcraft used is a dugout canoe of about 1 ton gross, measuring from 12 to 14 m. (39.4 to 45.9 ft.) long; 1 to 1.3 m. (3.3 to 4.3 ft.) wide and about 1 m. deep. It is generally propelled by sails while some (6%) are motorized, using 8 to 15 h.p. gasoline air- or water-cooled engines. A few (2%) are towed by motor launches (see over) and can use 4 dredge trawls. The dredge trawl fishing gear consists of 3 main parts, namely the towline, the dredge trawl frame and the net proper. A 30 m. (98.4 ft.) long, $\frac{1}{2}$ to 5/8 in. (1.27 to 1.59 cm.) diam. Manila rope is used as towline for the sailboat and motorized fishingcraft while the motor launch-towed craft uses a 50 m. (164 ft.) long 1 to $1\frac{1}{2}$ in. (1.27 to 3.8 cm.) diam. Manila. The frontal opening of the average dredge trawl frame is 110 cm. (43 7/16 in.) wide and 20 cm. (7 7/8 in.) high. A typical net proper is 2 to 3 m. (6.5 to 9.8 ft.) long and about 1 m. diam. at the mouth. A flapper is normally provided inside the net to prevent escape of fish that has entered the net. The catch consists mainly of white goby (65 to 95%) together with some other 5 spp. The average catch rate per hour is 4.5 kg. (9.9 lb.) for the sailboat and motorized craft and 12 kg. (26.4 lb.) for the motor-launch-towed craft.

(over)

 Reprinted in whole

COLOR CONTROL

TRAWLING FOR SHRIMP

PROCESSING SEA LIONS

DREDGE TRAWL FISHERY

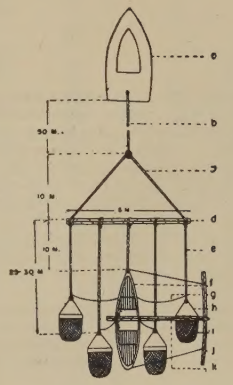
1.85 (Cross Reference: 1.0111, 2.1121)

wears sea boots, an oilskin apron and gloves, as it is a wet job and jellyfish in the net may cause painful sores on unprotected hands.

The green Manila tow rope runs from the drum at the head of the vessel's small mast. To haul in the net, the shrimper turns the winch with a foot pedal or a hand control and guides the rope around the drum. When the mouth of the net reaches the surface, the beam is detached at one end and allowed to float alongside the boat. The remainder of the net is hauled up over the vessel until the cod end appears. The cod end is vigorously doused in the sea to remove any clinging mud before being brought aboard.

The shrimp are usually boiled on board the vessel immediately after being taken aboard. Most of the catch is sold fresh, a part is frozen and a few are canned.

2.1121



a Tow boat motor launch
b Main tow line (remorke)
c Main bridle (parisukat)
d Bamboo beam (paripa)
e Fishing tow line (hapin)
f Fishingcraft
g Hauling line
h Fishing bridle line
i Trawl net
j Outrigger float
k Outrigger beam

Motor-launch-towed fishingcraft in operation using four nets (diagrammatic)

0.112 (Cross Reference: 7.8)

when the radiant energy is changed. In addition, a pair of objects may appear to have the same color when viewed under certain wave lengths of light. Objects illustrating this phenomenon are called metameric pairs. The facts must be considered when color standards are constructed.

Reflection of light.--Light may be reflected, transmitted, absorbed, or refracted. Reflected light refers to that part of the radiant energy which bounces back from the surface of the illuminate object. The color of an object depends upon the wave lengths of the light reflected. A surface appears to have gloss when the light is reflected more strongly at a specific angle.

Spectrophotometry.--The color of any object may be defined comprehensively by measuring the amount of reflection of light from the surface of the object at numerous wave lengths in the visible range. This determination may be made with the spectrophotometer. Thus a spectrophotometric curve of reflection is obtained which is characteristic of the object. However, in order to transform the data into meaningful values additional calculations are needed.

1.95 (Cross Reference: 6.10)

Table 1 - Measurements and Yield Data for Sea Lions of Varying Size and Sex

Sex	Total Weight	Liver		Hide		Meat (Free of Bone and Blubber)		Blubber	
	(Lbs.)	Weight (Lbs.)	% Total Body Wt.	Weight (Lbs.)	% Total Body Wt.	Weight (Lbs.)	% Total Body Wt.	Weight (Lbs.)	% Total Body Wt.
1. Male	425	13	3.1	28	6.6	274	35.7	63	14.8
2. Female	343	14	4.1	21	6.1	274	35.7	54	15.8
3. Male	695	19	2.7	-	-	-	-	-	-
4. Female	527	25½	4.8	-	-	-	-	-	-
5. Female	643	20	3.1	36	5.6	202	31.4	79	12.3
6. Female	484	14½	3.0	24	5.0	153	31.6	52	10.8
7. Male	1,121	26	2.3	70	6.2	341	30.4	128	11.4

Animals 1 and 2 were sexually immature, probably 2- or 3-year-olds.
Animal 3 was in a semidecomposed state when found ashore and complete data were not obtainable.
Animal 4 had well developed fetus and appeared to be nursing; 26 pounds of mammary tissue and milk were recovered. Only partial data were obtained.
Animals 5 and 6 each had a well-developed fetus; no indication of nursing.
Animal 7 had a stomach which weighed 102 pounds; stomachs of other animals weighed less than 20 pounds each. Stomach weights of all animals are included in the total weight.

2.112 "LIVLON" MS-4 HERRING WEB TESTED

Carrothers, John (Fisheries Experimental Station, Vancouver, B. C., Canada)
Western Fisheries 52, 19-20 (June 1956)

Two samples of a new synthetic fibre herring web were tested. One sample was unused herring seine web and the other, though from the same lot as the first, had been used as an experimental strip in a tarred cotton seine for about three months.

The general appearance of both samples was fairly good: the knots were well set and there was little fraying, even in the used sample, but both samples contained some K-mesh.

The synthetic fibre netting was both lighter in air and finer than 10/6 tarred cotton web. Thus, a seine of this material could be made larger for a given vessel and could be closed more easily than a similar one of tarred cotton. Because of its greater density, the synthetic web is heavier than tarred cotton in the water and should remain deep while the seine is being fished.

Livlon was found to be 28 percent stronger in the wet mesh than the 10/6 tarred cotton web. This strength was retained during the three months of fishing.

The mesh length of the Livlon samples increased when the netting was wetted, tarred cotton netting shrinks when wetted. Allowances must be made for this different reaction to wetting. Livlon should be hung in less on the lines than is tarred cotton.

These encouraging results indicate that more extensive trials should be performed with the new webbing.

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.1124 FISHING METHODS AND GEAR - TRAPS - MISCELLANEOUS TRAPS

Rasalan, S. B.
The Philippine Journal of Fisheries 2, 211 (July-December 1953)
World Fisheries Abstracts 7, 23 (July-August 1956)

Fish corrals are guiding barriers which are used in sheltered waters to intercept fish during their movements or migration and impound them in a collecting chamber where they are caught. These are constructed in various styles, ranging from a simple ambulatory pound, with or without a leader, to a more or less complicated structure consisting of a series of enclosures, gates, wings and a long leader which are so arranged as to effect an easy entrance but difficult exit for the intercepted fish.

Of the many types of Philippine fish corrals, the new hasang moderno is considered to be most effective. Like the many other fish corrals, it consists of a series of enclosures with a leader, 4 wings and 3 entrances (see over). It differs, however, from the other types in that the terminal pound is located in the same axis as the leader on the outer side of the semi-circular enclosure which it superimposes. The multiple entrances, together with the leader and the series of enclosures, effectively prevent the escape of intercepted fish.

The method of construction and operation of the gear is described giving complete specifications and costs. Descriptions of the collecting nets, boats used, and catches are also given.

See illustration, over.

(over)

Reprinted in whole

2.1128 DUNGENESS CRAB POTS

Hipkins, Fred W. (Fishery Products Laboratory, Ketchikan, Alaska)
Fishery Leaflet 419, 11 pp. (July 1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

Dungeness crabs (Cancer magister), which are native to the Pacific Coast from San Francisco, California to Kodiak, Alaska, are taken commercially in crab-pots. Pots are the only gear permitted for commercial use on the Pacific Coast. More than 64,000 pots, valued at 1½ million dollars, are used annually to catch nearly 31 million pounds of crab.

Two types of pots, circular and rectangular, are used in the fishery. The circular pot is known as the standard-type Dungeness crab pot and is the more commonly used of the two. It is designed and constructed so that it will remain in an upright fishing position on the ocean floor regardless of heavy wave action or tidal currents. This is important because most of the Dungeness crab are caught in the open coastal areas.

The typical circular pot is about 42 inches in diameter, 14 inches in depth, and has two side openings or "tunnels" for the crabs to enter. Each pot weighs about 90 pounds without the line and buoys. The bottom of the pot is about two inches larger in diameter than the top and has two iron bars reaching across the bottom frame. The supports are curved so that the pot will always fall on the bottom frame. The entire pot is handwoven of 19-gauge (1/32 inch) Monel wire. The frame is made of mild structural steel rod.

The rectangular pot is box-like in shape and lightly constructed. It weighs about 35 pounds. Its use is confined to inside protected waters where it can be fished from small boats and lifted or hauled by hand.

In Oregon and Washington, clams, herring, squid, and salmon and lingcod heads are used for bait. Clams are preferred. In the Alaskan fishery, herring is the preferred bait.

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.1128 SLED-TYPE SCALLOP DREDGE TRIPLES HAULS

Anonymous
National Fisherman 37, 16-17 (August 1956)

A new type of British scallop dredge with the blade held at the optimum angle in relation to the bottom has been found to be about three times as efficient as the standard scallop dredge. The new dredge is as easy to empty, by means of the cross-stick lifting bridle, as the standard dredge. Due to the controlled "bite" of the teeth, the sledge dredge requires less power for towing than the standard dredge. It also occupies less space on deck than a dredge of the standard pattern for a given width of blade.

The optimum angle of attack of a scallop dredge blade is the minimum that allows the catch to be lifted the necessary height to pass over the blade and into the bag. The standard scallop dredge used in Britain consists of a triangular frame of heavy iron, bent to an acute angle at the base, with a toothed blade attached to the bent portion, thus forming an acute angle with the main framework and with the bottom when the dredge is in operation.

Recent underwater observations of the standard Irish scallop dredge, which is a toothed bar, showed that the dredge travelled along the bottom in a series of shallow leaps. This skipping resulted presumably from the digging of the teeth, followed by the stretching of the warp until the tension was sufficient to pull the teeth out of the sand. A further disadvantage of the standard dredge is that by its shape it makes a very efficient grapple, and may foul any steep projection or piece of wreckage on the bottom.

The new British sledge-type dredge overcomes these disadvantages and has additional minor advantages.

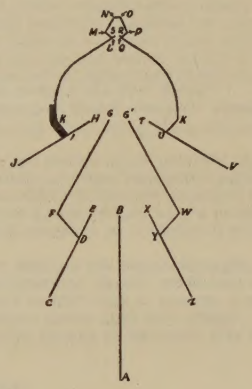
A standard dredge blade with teeth is mounted on 2 inch by ¼ inch flat iron runners, 3 feet long, which curve upward to a height of 4 inches at the leading edge. The blade is mounted so that the teeth

(over)

ABSTRACTER: Kathryn L. Osterhaug

2.1124

The New Hasang Moderno



AB leader; CE and XZ lower wings; JH and TV ı TV upper wings; EX, GH and G'T gate; DFGDFGG'WY forechamber; IKSRK'UT semi-circular enclosure; LMNOPQ terminal pound.

2.1128 (Cross Reference: 1.84)

project about ½ inch below the bottom edge of the runners.

The runners are joined by an angle-iron bar s across the leading edge and by two bars, mounted vertically, one at each end of the blade, rising to a height of 1½ feet and joined horizontally at their upper ends by a 2 inch angle-iron bar. This upper horizontal bar is in turn joined on either side to the leading edge of the runners. The dredge blade is strengthened by three bracing bars joining the blade to the upper horizontal bar. In the center of the two transverse bars a longitudinal brace is fitted, which is raised 3 inches. Placed over this, and extending to each side of the dredge, a sheet of 16 S.W.G. steel is fixed to form a diving plate, raised in the center to form a dihedral angle.

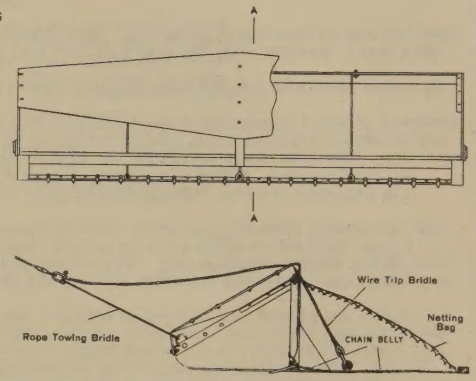


Figure 2 (drawing on top)-front elevation of new sled-type scallop dredge. Section through A-A is shown in figure 3 (drawing on bottom), which includes details of tow, trip, bridle, and bag attachment.

2.112

Test Results — MS-4 "Livlon" and Cotton

	MS-4 Livlon New	MS-4 Livlon Used	10/6 Cotton White	10/6 Cotton Tarred
Twine				
Weight (yds. - lb.)	940	930	1120	640
Tensile strength (lbs.)				
dry	21.0	20.0	11.7	
wet	17.2	15.7	12.8	
Stretch at rupture (%)				
dry	22	25	17	
wet	22	23	33	
Netting				
Weight at 100 meshes deep in air, dry (lms/lb.)	1.75	1.63	1.82	1.05
in water (lbs./100 lbs. in air)	28½		35	21
Mesh strength (lbs.)				
dry	27.4	26.7	14.7	14.4
wet	23.1	23.1	17.1	18.0
Change to wetting	−16%	−14%	+16%	+17%
Mesh strength efficiency (%)				
dry	65	67	63	
wet	67	73	67	
Mesh length (inches)				
Marked (1-7/16"=1.4375")				
Measured				
dry vertical	1.43	1.30		
horizontal	1.42	1.28		
wet vertical	1.45	1.37		
horizontal	1.43	1.34		
Change from unstressed				
dry to: unstressed wet	+1.2%	+5.3%	−9.8%	−7.5%
wet rupture	+24%	+30%	+17%	
Shrinkage during use				
dry		9.4%		
wet		5.7%		

2.1128

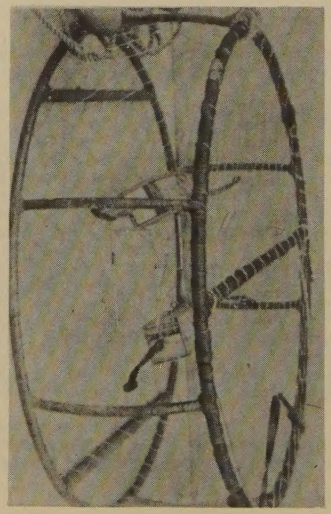


Figure 2 - A standard-type Dungeness crab pot. (42-inch diameter)

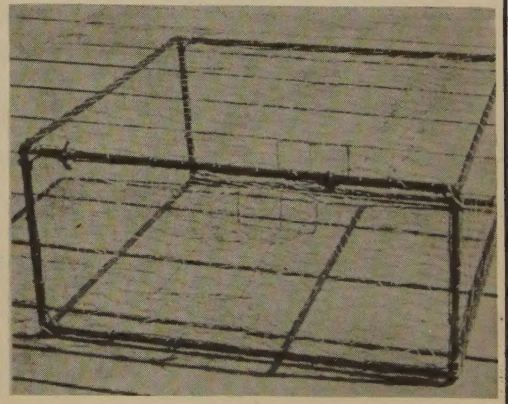


Figure 3 - A rectangular Dungeness crab pot. Its use is confined to inside protected waters.

2.115 NEW PLYWOOD BAIT BOAT "AQUARIUS" FEATURES NOVEL METHOD OF LOADING FISH

Anonymous
National Fisherman 37, 13 (November 1956)

A unique method of loading and unloading bait cargoes has been incorporated into the construction of a new bait-boat built in San Diego, California. The new design has made it possible to eliminate the use of scoops, shovels, buckets, and conveyor belts for loading or unloading the bait haul. The fish are never touched.

The Aquarius carries ballast tanks fore and aft formed by the skin of the boat, and two bait tanks with a capacity of 18 tons. When she takes on bait, the boat is lowered by ballast; the crew pulls the bait nets to starboard and forces the fish to swim into the two plywood bait tanks through two 2-foot square openings. For the loading operation, the doors to the openings are lifted. When the bait is in the tanks, the doors are closed. After the bait is loaded, the tanks are filled to capacity with water. The coamings to the bait tanks extend 42 inches above the deck.

The fish can be delivered to the receiving boats through portable plywood chutes that are attached to openings in the coamings on the port side. These chutes are 12 inches wide and 8 inches deep. They are lowered to within a few inches of the receiving boat's bait tanks, so that the fish are transported without injury.

See illustrations, over.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.115 HYDROCONIC HULLS IN TRAWLER DESIGN

Tarn, K. W. (Seawork, Ltd.)
World Fishing 5, 28 (July 1956)

Basically, the hydroconic hull is formed by surfaces which are developed geometrically--in fact the surfaces are a combination of cylindrical and conical forms. This means that all the shell plating is "wrapped" on, and takes a natural curvature, and by virtue of this, advantages are claimed in as much as shell plating repairs are very much more easily carried out.

Repairs simplified.--Framing repairs are also simplified by the fact that no curved frames or beams are necessary. The hull in the region of the side framing is developed from cylindrical surfaces, and therefore the transverse sections are straight lines, and the deck is arranged with straight line or "peaked" camber. This does not mean that the hull has straight line sections throughout. On the contrary, conically developed parts of the hull have curved transverse sections, but solid floors are arranged in these regions and the framing shape is obtained by plate burning rather than bar bending. With this type of construction it will be realised that hull maintenance should be made very much easier, and can be carried out by establishments who otherwise could not tackle repairs to vessels of this type.

The design of the trawlers has been prepared with a view to providing a steady fishing platform by virtue of the careful selection of metacentric height and to perpetuate the good propulsive and sea-keeping qualities of existing hydroconic tug and coaster forms. Although there is as yet no hydroconic trawler in service, it may be of interest to readers to learn of the sea-keeping characteristics of the latest and largest hydroconic tug, the 120 ft., 1,350 b.h.p. vessel Sydney Cove, now nearing Australia at the conclusion of her delivery voyage from the U. K.

(over)

 Reprinted in whole

2.118 NEW TECHNIQUES FOR FREEZING AND STORING NORTH ATLANTIC LOBSTERS

Peters, John A. and Slavin, Joseph W. (Fishery Technological Laboratory, East Boston, Massachusetts)
Commercial Fisheries Review 18, 22-23 (July 1956)

Large numbers of deep-sea lobsters have been discovered in the Georges Bank fishing area off the coast of Massachusetts by Fish and Wildlife Service employees on board the exploratory vessel, Delaware. To facilitate utilization of these lobsters, experiments have been conducted at the Service's East Boston Technological Laboratory to determine (1) the feasibility of freezing lobsters aboard the fishing vessel, and (2) means of increasing the storage life of frozen lobster meat.

Lobsters frozen in sodium chloride brine (22 percent salt by weight) were found to be not satisfactory. Those that came into direct contact with the brine suffered from excess salt penetration into the meat, and those that were protected from direct contact lost flavor and texture quality within three weeks when stored at 0° F.

A freezing solution designed to provide a protective glaze on the lobster, yet not cause excessive salt penetration into the meat was then used. A glucose (34 percent)-salt (12 percent) solution seemed to have the desired properties. An experiment was then designed to determine the possibility of freezing cooked whole lobsters in a glucose-salt solution aboard the fishing vessel, landing the lobsters in a frozen condition, thawing ashore, vacuum packing the meat in cans, refreezing, and storing the frozen meat.

After 8 weeks from the time of freezing the whole lobsters no deterioration in the quality of the

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.5 SUGGESTIONS FOR CRAB MEAT PACKERS AND FOR TRANSPORTERS OF FRESH CRAB MEAT

Anonymous
Commercial Fisheries Review 18, 41-43 (July 1956)

Fresh crab meat shipped to the City of New York must conform to the bacterial standards prescribed in New York City's Sanitary Code. The Director of the Bureau of Food and Drugs of New York City's Department of Health sent letters with suggestions for shipping crab meat to New York City to packers of fresh crab meat and to trucking companies and express firms that transport crab meat to New York.

In the letter to the crab meat packers, it is pointed out that in order to meet the bacterial standards, it is absolutely essential that the crab meat be prepared, handled, and packed under strict sanitary precautions in a plant that is certified by the local inspection service. It is also absolutely essential that the crab meat be adequately refrigerated from the time of packing until it reaches its destination. The following suggestions were made to aid in maintaining bacterial quality control during the shipment: (1) use shipping containers of sufficient size to provide maximum space for storage of ice; (2) pack cans into barrels or other shipping containers in a manner that will allow spaces between the cans to facilitate thorough icing and re-icing all around can surfaces; also avoid overloading or stacking cans directly on top of each other; (3) eliminate delays in time and additional handling by direct shipments from your plant to New York City instead of reshipments through another dealer; (4) check your carrier's equipment relative to refrigeration or ability to maintain cold temperatures; also location of icing stations en route; (5) request re-icing of your shipments in transit at suitable intervals, especially in warm and hot weather; (6) arrange for direct deliveries of your shipments if possible without long delays resulting from consolidations or transfers of loads, lay-overs at

(over)

 ABSTRACTER: Kathryn L. Osterhaug

2.115

The captain of the vessel has reported as follows: " . . . We have covered the voyage from Falmouth to this port (Colombo) at 10½ knots on 2.2 tons daily, always at 1 notch below full speed. The Chief reports the engine is O.K., and we are staying here 2½ days for top overhauling done by the three engineers. So much for the engine. I can only express great admiration for the hull design of the vessel. She steers like a 'Lady' even in a high following sea, viz. SW. monsoon Aden to Colombo."

Standard range.--As far as tugs are concerned we have developed a standard range of these hydroconic craft, although it is not always possible to use a vessel "off the shelf," but by building craft with only slight modifications it is possible to offer an attractive price and delivery in many cases. It is hoped that such a policy might prove attractive to the trawler owner, and there is some evidence that the dimensions of trawlers are being standardised by the regulations of the White Fish Authority Grants and Loans Scheme--e.g. the 140 limit has meant that a class of vessel about 139 ft. long is developing, and the 116 ft. limit is bringing in another class of 115 ft. 6 in. It is hoped that with the hydroconic trawler it will be possible to offer standard vessels of these two limits.

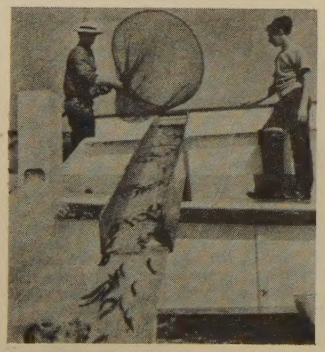
It is also, of course, quite possible to standardise the larger trawlers, and experimental work with this in view is under way. It must be stressed, however, that should owners resist standardisation, we are quite prepared to advance individual designs for individual owners, although this is bound to affect the price of the vessels.

2.5 (Cross Reference: 1.86)

transfer points, circuitous routing, etc.

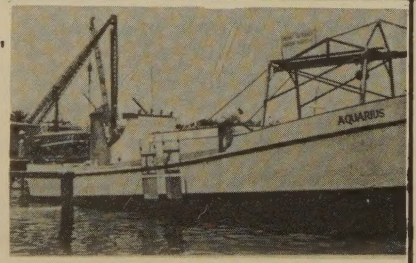
The following suggestions were sent to trucking and other transportation companies: (1) check amount of ice and salt carried to assure that it is adequate for the entire load and for insulation defects; (2) if mechanical refrigeration is used, check for proper working order and if adequate to maintain sufficiently low temperatures for the load carried and, if necessary, supplement with dry ice; (3) precool vehicles during hot weather before loading; (4) place loads in such a manner as to allow circulation of air around the shipping containers; use of floor racks for this purpose is advisable; (5) where ice is used for refrigeration, check drains to insure against stoppages; plugs for ice bunkers should be tight-fitting; (6) do not skimp on ice in warm and hot weather and see that all cans inside barrels and boxes are well re-iced; arrange with packers for re-icing of their shipments en route; (7) provide re-icing stations at suitable intervals along routes and make certain that stops are made for the purpose of re-icing; (8) avoid the alleged practice of skipping re-icing stations and then re-icing just before arrival in New York City to mislead receivers; (9) avoid long delays in transit caused by consolidations or transfer of loads, lay-over at transfer points, circuitous routing, etc.; and (10) make employees aware of precautions to be taken during long hauls in hot weather when vehicles are subject to a great deal of heat over the highways.

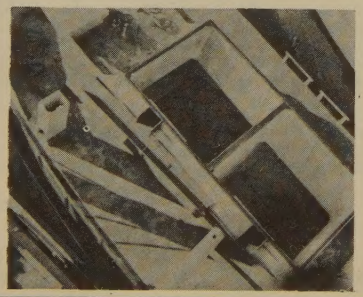
2.115



Removable plywood chute which is used for transferring the bait fish from the plywood bait tanks to the receiving boats.

New California bait boat "Aquarius" has two openings on starboard side, through which the bait fish are forced to swim from the net.





Bird's eye view of fish tanks on bait boat "Aquarius". The tanks are made of double thickness ¾-inch exterior type fir plywood, coated with resin and Fiberglas.

2.118 (Cross Reference: 1.87)

meat had occurred. Lobsters butchered before freezing were slightly, but not objectionably, salty. No salt penetration was noted in the lobsters that had been frozen whole.

The glucose-salt freezing solution used seemed to provide a protective glaze that increased the storage life of frozen whole lobsters. These results indicate that freezing of deep-sea lobsters on board a fishing vessel is a definite possibility. Tests on a larger scale are to be conducted.

2.19 CHEMICAL CHANGES OCCURRING DURING THE SPOILAGE OF CHILLED FISH AND THEIR RELATION TO FRESHNESS TESTS

Shewan, J. M.
Chemistry and Industry No. 27, 713 (July 14, 1956)

Dr. Shewan said that the authors wished to describe and explain some of the changes occurring in white fish during storage in ice. In so far as the muscle extractives (nitrogenous bases, amino acids, sugars, nucleotides, nucleosides, volatile bases and fatty keto-acids) are believed to be major flavouring constituents, their changes could be expected to give some measure of quality. Attention was confined to cod, the most important economic species. Average analyses in fresh cod collected over a period were given and seasonal variations in trimethylamine oxide and amino-acids described. Individual values at any time vary considerably from one fish to another.

By the incubation of sterile muscle blocks, excised aseptically from freshly killed fish, it has been possible to study autolytic changes uncomplicated by bacterial attack and leaching by ice melt water. By comparison with results from iced gutted fish it was shown that most changes in volatile bases and amino-acids, particularly, resulted from bacterial attack but that some of these, namely in the amino-acids, anserine, nucleotide and sugar contents were autolytic. Losses in some constituents by leaching were considerable. During stowage in ice, most rapid change is often after 10-12 days and it is significant that spoilage as judged by sensory data is accelerated and the character of the bacterial flora alters also at this stage.

For practical purposes four main quality groups can be distinguished during storage in ice, namely, I. 0-6 days, II. 7-10 days, III. 11-15 days, IV. >15 days. After describing extensive statistical studies underlying a "taste panel" technique to which any objective method of assessing spoilage must be

(over)

Reprinted in whole

3.19 MANY MILESTONES FACE FOOD IRRADIATION

Urbain, W. M. (Swift and Company, Chicago, Illinois)
The National Provisioner 135, 26, 29 (July 7, 1956)

The flavor developed in foods by the process of irradiation is unique to the process. It has at times been described as scorched and is generally associated with the protein components of the food. Although fats are affected by radiation, they do not give rise to the irradiated flavor. It has been established that the amount of off flavor is proportionate to the amount of radiation.

Evidence seems to be developing that the characteristic off flavor originates in proteins containing sulfur and more specifically in sulfhydryl groups. Compounds such as mercaptans and hydrogen sulfide may be associated with the irradiated flavor.

A number of tools have been developed to try to get objective evaluations of flavor. One of these is vapor phase chromotography combined with a mass spectrograph at the Natick Quartermaster Research and Development Command. This work may lead to identification of compounds involved, some understanding of their source in food, and how they are formed.

Previous work on flavor retention included (1) removal of atmospheric oxygen to diminish flavor changes; (2) irradiation in the frozen state to render the water less available for free radical formation and thus curtail side reactions; and (3) the use of additives, so called free radical acceptors such as ascorbic acid, which appear to minimize the availability of free radicals for flavor formation.

One major point of concern with storage is the action of enzymes that bring about food deterioration. Radiation dosages required to destroy these enzymes is considerably above that required to

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.19 THE RADIATION PRESERVATION OF FOODS, A PANEL DISCUSSION

Pomerantz, Reuben; Cook, Truman F.; Kraybill, H. F.; and Jackson, William D. (Quartermaster Food and Container Institute, Chicago, Illinois)
Industrial Refrigeration 131, 15-19 (November 1956)

Nature of the radiation process.--In radiation processing, food is exposed to either beta or gamma type rays. These invisible penetrating rays either kill or prevent the reproduction of microorganisms and thus preserve the food from microbial spoilage.

Current state of radiation.--There are four prerequisites that radiation preservation must satisfy: (1) the treatment must kill the microorganisms in the food; (2) the irradiated food must be wholesome; (3) the treatment must not adversely change the color, odor, taste or texture of the food; and (4) the process must be economically feasible.

There is no doubt but that radiation will kill all of the microorganisms found in the food, provided a sufficient dosage is used. The following radiation dosages are fairly well established: (a) at 12,000 reps potatoes and onions are inhibited from sprouting; (b) at 30,000 reps trichina worms and insects are killed; (c) at 200,000 reps most microorganisms are killed-pasteurization; and (d) at 2,000,000 reps the most resistant of bacteria are killed-sterilization.

Final judgment regarding the wholesomeness of food must be reserved until much more information is accumulated. Data already available indicates that irradiated foods do not become radioactive and are neither toxic nor harmful.

Foods respond individually to radiation in regard to color, odor, taste, and texture changes. Milk, for example, will develop undesirable flavor changes at 100,000 reps whereas dried prunes will withstand 3,000,000 reps without damage.

Economic feasibility is a matter of conjecture at the present time. There is at present no reliable experience upon which to base firm economic estimates. The best present estimates are as follows:

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.23 REFRIGERATION OF FISH - PART 1. COLD STORAGE DESIGN AND REFRIGERATION EQUIPMENT

Butler, Charles; Slavin, Joseph W.; Patashnik, Max; and Sanford, F. Bruce
Fishery Leaflet 427, 146 pp. (June 1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

This leaflet is divided into three sections, the titles of which are as follows:

Section 1 - Cold Storage Design
Section 2 - Refrigeration Equipment
Section 3 - Refrigeration Requirements and Freezing Methods

Subjects treated in section 1 (cold-storage design) are:

Location
Design and construction
Product environment
Calculation of the cold storage requirements of fish

In the subsection on calculations, the reader is shown how to calculate the heat-gain load in the cold-storage room, how to calculate the size of the compressor, and how to calculate the size of the evaporator. Numerous illustrative samples show exactly how the calculations are made.

Subjects treated in section 2 (refrigeration equipment) are:

Compression system

(over)

ABSTRACTER: F. Bruce Sanford

CHANGES IN ICED FISH

RADIATION PRESERVATION

FOOD IRRADIATION PROBLEMS

COLD-STORAGE DESIGN

3.19

(1) to stop sprouting in potatoes or onions, .01 to .05 cents per pound; (2) to kill insects in grain, .04 to .08 cents per pound; and (3) to sterilize meat, 1 to 5 cents per pound.

The radiation sources may be either reactors using nuclear fuel that produce gamma rays or electron generators that produce beams of electrons. The electron generator industry is capable at present of constructing machines of any desired operating ratings. These machines have the advantages of portability, low operating cost, and high efficiency. They do not use fissionable material. However, they are limited to treating foods processed in slabs such as bacon, steaks, fish fillets, cheese, or grain. Reactors appear to be the most feasible for gamma radiation.

The effect of radiation sterilization on wholesomeness of foods.--Before irradiated foods can be termed acceptable they must be proven safe for human feeding. During the past year a broad research program in this field has been supported at thirteen universities and privately sponsored research institutes as well as at the Medical Nutrition Laboratory, Fitzsimmons Army Hospital, Denver, Colorado.

Wholesomeness studies encompass at least three areas of interest: (1) nutritional adequacy; (2) toxicity; and (3) carcinogenicity. At this time, no residual toxic effects from the consumption of irradiated foods has been reported.

Future potentialities for radiation.--(1) Decrease of food losses by insect control; (2) may be combined with canning to lower the heat process which might result in improved texture and flavor for the canned product; (3) by killing insects and plant diseases with radiation it may be possible to lift the quarantine on many tropical fruits; (4) irradiation may decrease the costs of food handling through increased storage life; this would also allow wider distribution of perishable items; and (5) irradiation may prove valuable in the control of certain diseases such as trichinosis and salmonella.

3.23

Absorption system
Comparison between the absorption and compression system
Evaporation
Refrigerants

Subjects treated in section 3 (refrigeration requirements and freezing methods) are:

Refrigeration requirements
Package and product factors in freezing
Refrigeration-systems factors in freezing
Freezing methods
Sharp freezers
Multiplate freezers
Blast freezers
Immersion freezers

The subject matter of the leaflet is illustrated by 43 figures and photographs, including the accompanying figure 15.

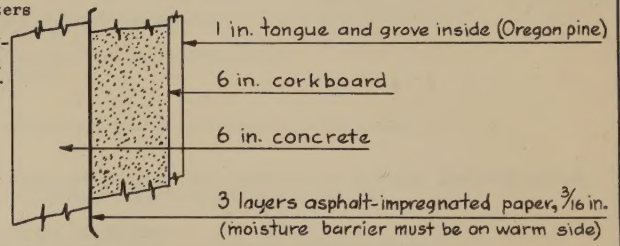

1 in. tongue and grove inside (Oregon pine)
6 in. corkboard
6 in. concrete
3 layers asphalt-impregnated paper, 3/16 in.
(moisture barrier must be on warm side)

Figure 15.--Cross section of wall of cold-storage room.

2.19

ultimately referred, Dr. Shewan described two such procedures which appeared likely to satisfy criteria for a reliable index, within certain defined limits. The first, of value in Group I (which may be of importance if it is fully confirmed that top quality frozen fish can be best obtained from fish stowed in ice no longer than 3 days) measures the dephosphorylation of adenine nucleotides by barium fractionation and bound ribose determinations of the extracts. This procedure has, however, not so far been correlated with sensory data. Total volatile base and trimethylamine determinations have been used extensively in the later stages and a considerable body of statistical information was presented on the relationship between, say, total volatile base values and cooked flavour scores, or between trimethylamine and raw odour scores. Many other potentially useful procedures such as chromatographic estimation of lysine are too lengthy.

Finally, it was indicated that studies were being continued particularly on volatiles which are likely to prove useful as objective indices of spoilage.

3.19

destroy bacteria. If inactivation of enzymes is necessary to secure stable foods, procedures in addition to irradiation will be needed.

2.2 AIR CONDITIONING SYSTEM KEEPS OYSTERS COOL

Anonymous
Industrial Refrigeration 131, 6 (July 1956)

An unusual air conditioning application, believed to be the first of its kind, permits oysters at a Norfolk, Va., plant to lounge in luxurious cool comfort while awaiting shucking. Previously, the oysters were stored on ice overnight, still in their shells, until they could be shucked and packed the following day. This cooling method has now been replaced by an air conditioning system.

As they are unloaded from the oyster boats, the bivalves are piled over perforated pipes on the storage room floor. Cold air is forced through the pipes and permeates the piles of oysters, keeping them cool and fresh until the next day's shucking. Cold air is also supplied into the space through grilles.

Two specially-designed ceiling type air conditioning units supply the cooling. Each unit has an air volume of 4000 CFM at 4 inch external static pressure. The units are arranged with stainless steel shaft and hot dipped galvanized casing, with 1 inch of waterproof insulation.

This plant actually has a 75-ton chilled water installation. This 75-ton capacity is used during the processing to keep the oysters properly preserved. This water cools the vats and the cleaning water for the oysters. The air conditioning for the storage area, operates a large part of the time when the processing is not in operation. The capacity requirement for the air conditioning of the storage area requires approximately 30 tons. This air conditioning system is used over the weekends and sometimes at night to preserve the oysters that are stored for shucking and processing.

(over)

Reprinted in part

3.235 SEA TREAT FROM THE NORTHWEST

Anonymous
Modern Packaging 29, 154, 165 (June 1956)

Whole, cooked Dungeness crab, long available in fresh markets on the Pacific Coast, is now available frozen in major cities of the Atlantic Seaboard. To accomplish this, a new method of freezing and packaging was pioneered by a Seattle, Washington seafood distributor.

Crabs are caught off the coast of Washington, British Columbia and Alaska and carried alive in seawater tanks aboard the fishing vessels to shore canneries. After being cooked, the perfect crabs in the 1¾ to 2¼ pound range are selected for freezing.

Before freezing, the legs of the crab are folded under and held in place with a rubber band. Freezing is accomplished by submerging the crab in 0° F. brine for 30 minutes. After freezing, the band that held the crab legs in place is removed, the crab is placed in an individual polyethylene bag and the bag is heat sealed. Twelve crabs are packed into a carton for shipment to retail outlets.

See illustration, over.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.235 QUALITY CONTROL IN PRECOOKED FROZEN DINNERS

Barclay, Joseph (Frigidinner, Inc., Philadelphia, Pennsylvania)
Frosted Food Field 23, 45, 61 (July 1956)

An outline of standards development for use in controlling the quality of frozen dinners includes the following:

1. Selection of Raw Materials
   a. Develop specifications for raw components. These will aid in purchasing and will simplify production.
   b. Develop inspection procedures for receiving department.
2. Preparation and processing
   a. Develop standards for portion size of component foods.
   b. Develop standards for preparation and processing techniques for each component.
   c. Establish standards for proper assembly techniques.
3. Packaging
   Establish standards for packaging materials and techniques.
4. Storage
   a. Develop storage procedures for raw materials.
   b. Establish proper storage techniques for finished products.
5. Sanitary standards
   a. Establish standards for finished product.
   b. Develop good sanitary standards for production.

Exhibit A and Exhibit B are sample laboratory reports used in conjunction with the quality control

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.236 PRESENT SHRIMP OPERATIONS EXPENSIVE - - SURVEY INDICATES NEED FOR PLANT REORGANIZATION

Anonymous
Fishing Gazette 73, 50-51, 84, 146 (June 1956)

According to a survey supervised by the Fish and Wildlife Service, plant layouts commonly found in the frozen breaded shrimp industry call for a preponderance of hand labor and result in production costs that are excessive. The cumulative effect of the inefficient use of labor at various stages of production has a marked effect upon the cost of the end product.

Members of the research organization compared in detail the operations of several plants that produce frozen breaded shrimp. The organizations engineers have combined the most efficient methods and equipment found in these plants into one composite layout. A schematic flow diagram of the synthesized layout is reproduced on the back of this card. Table 2 provides an analysis of the operation by giving the estimated production rates and man hours in terms of end product.

2. Estimated Production Rates and Man-Hours in Terms of End-Product

Operation No. and Name	Type Operation	Production Per Man-Hour (End Product Weight)	Man Hours Required Per 100 Pounds End-Product
1 Receiving	Hand	4,000 lbs.	0.025 M/Hrs.
2 Grading	Machine	1,330 lbs.	0.075 M/Hrs.
3 Peeling	Hand	26.6 lbs.	3.759 M/Hrs.
4 Splitting & Deveining	Machine	106.4 lbs.	0.939 M/Hrs.
5 Breading	Machine	158 lbs.	0.633 M/Hrs.
6. Packing	Hand	50 lbs.	2.000 M/Hrs.
7 Weighing	Hand	250 lbs.	0.400 M/Hrs.
8 Packaging	Machine	1,500 lbs	0.067 M/Hrs.
9 Freezing	Machine	900 lbs.	0.111 M/Hrs.
10. Master Carton	Hand & Machine	334 lbs.	0.299 M/Hrs.

See illustration, over.

(over)

ABSTRACTER: Kathryn L. Osterhaug

AIR CONDITIONED OYSTERS

QUALITY OF FROZEN DINNERS

FROZEN WHOLE CRAB

BREADED SHRIMP PRODUCTION

3.235

program of the author's company.

EXHIBIT A

SAMPLE REPORT
BACTERIOLOGICAL LABORATORY X
Philadelphia, Pa.

Item	Hemolytic Streptococcus	Coliform Organisms	Bacteria Plate Count per gram
Fish Stick Dinner			
Fish Stick	negative	10	1,200
Macaroni	"	0	11,000
Peas	"	0	4,800
Turkey Dinner			
Peas	negative	0	2,200
Potatoes	"	0	less than 100
Gravy	"	0	200
Turkey	"	0	400
Filling	"	0	37,000
Filling—no heat	"	0	40,000
Filling—heated 20 min. at —°	"	0	less than 100
Fresh Bread—unsterilized	"	0	5,800
Fresh Bread—sterilized	"	0	less than 100

Foods should have plate count under 10,000 and coliform organisms under 50 per gram.

EXHIBIT B

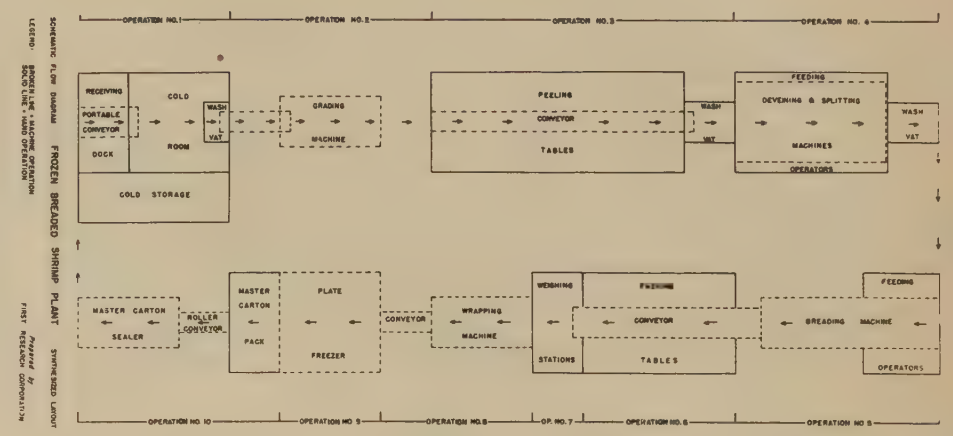
SAMPLE REPORT
X LABORATORY
Connecticut

Weight Analysis

	(1) Pot Roast	(2) Swiss Steak	(3) Chopped Beef	(4) Fish Stick	(5) Roast Turkey
Net oz.	11.9	12.0	12.6	9.9	15
Declared weight	10.0	11.0	12	10	12
Meat Component	2.4	3.8	4.6	3.9	2.6
Quality of Components %					
Meat	100	90	100	100	82
Gravy	90	80	100		100
Vegetable	60	100	90	100	100
Stuffing					
Potato or Macaroni	60	100	100	95	78
Weighted Average	82	90	98.8	98.8	89.6

Comments:
1 — Potato acid and granular; gravy too acid.
2 — Meat tender; flavor good; peas slightly watery.
3 — Outstanding product.
4 — Good product; testers question whether topping is cheese.
5 — Meat somewhat dry; potato acid flavor; gravy good.

3.236



2.2 (Cross Reference: 1.81)

There are two air handling units. Each unit operates half of the storage area with part of the air being fed in the open area through grilles and the large part of the air being fed through perforated piping in the bottom of the oyster bed.

3.235 (Cross Reference: 1.86)

Visibility, unusual in frozen foods, has been important in introducing this Northwestern specialty to Eastern markets. Selected crabs are cooked, frozen in brine bath which seals the shell itself as a protective "package" and then packaged individually in printed polyethylene bags.

3.236 HOUSEHOLD CONSUMER PREFERENCES FOR BREADED SHRIMP AND BREADED FISH STICKS - PART 2

Kahn, Richard A. and Stolting, Walter H. (Branch of Commercial Fisheries, Fish and Wildlife Service, Washington, D. C.)
Fishery Leaflet 425, 1-105 (September 1955) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

A nation-wide survey has been made of household consumer preferences for breaded shrimp and breaded fish sticks. In this second of a series of reports on this subject, the respondents are classified into farm and nonfarm groups, and into rural groups and various sized city groups. Supporting information about home and restaurant consumption of fish and shellfish is also included.

Frozen breaded fish sticks and frozen breaded shrimp have made spectacular sales advances. The fishing industry is interested to know if these favorable developments were based on permanent and expanding markets for fish sticks and shrimp. This survey supplies reliable consumer information to analyze these market developments.

The largest marketing problem concerned is to get the homemakers to try the products. Nine out of ten homemakers trying breaded shrimp became satisfied customers. Breaded shrimp consumption is concentrated in urban areas where the consumption is about twice as high as in rural areas.

The rise in fish stick sales is also due mainly to urban consumption. The larger the city, the higher the fish stick consumption. About 40 percent of urban housewives use fish sticks whereas 13 percent of the farm housewives use fish sticks. The acceptance rate of fish sticks among housewives is very high in both rural and urban areas.

(over)

 ABSTRACTER: Lois Elgin

3.237 STORAGE TESTS ON FROZEN FRIED FISH STICKS PREPARED FROM PACIFIC COD

Patashnik, Max and Dassow, John A. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 18, 15-18 (July 1956)

Commercially prepared fried fish sticks from specially prepared blocks of good quality Pacific cod were frozen at -20° F. and stored at 0° F. The samples were organoleptically judged at monthly intervals using the proposed United States Standards for Grades of Frozen Fried Fish Sticks as a guide. Table 1 explains the scale of organoleptic ratings used. Table 2 (not shown) summarizes the results of the examinations over a period of eleven and one-half months.

Conclusions.--(1) The quality changes most critically affecting the storage life of frozen fried fish sticks made from good-quality Pacific cod (Gadus macrocephalus) prepared under commercial conditions (deep-fat fried at 380° F. for 55 seconds in hydrogenated oil that had been used in fish-stick processing for about 20 hours) and stored at 0° F. were the oxidative changes in the layer of skin fat in the dark meat.

(2) The maximum period that fried fish sticks, produced from good-quality Pacific cod under the conditions of this experiment, can be stored at 0° F. in good marketable condition 4/ was organoleptically determined to be 8 months.
4/ (footnote 1/ on page 15) The rating "good marketable condition" is defined as being equivalent to not less than grade B (a minimum score of 70 points) in the proposed United States Standards for Grades of Frozen Fried Fish Sticks.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.237 FISH STICKS SPED BY HOT UNITS

Kohr, John M.
Food Engineering 28, 66-68 (August 1956)

Engineers designed the fish stick line of a new Gloucester sea food plant in such a way as to overcome four problems in the manufacture of fish sticks. These problems were as follows: (1) excessive sawdust from sawing blocks of frozen fish to make fish sticks, (2) a need for care in handling to prevent breakage of fish sticks, (3) moisture migration which caused fish stick shrinkage, and (4) hand packing which is a costly operation.

Sawdust waste reduction.--To reduce fish stick yield losses from sawdust, the engineers designed (1) a primary conveyor that moves frozen fish blocks 20 by 11 5/8 by 1½ inches in size through 2 parallel band saws and (2) a secondary conveyor that moves frozen fish slabs 20 by 3¾ by 1½ inches in size from the primary saws through a band saw that cuts them into 20 by 3¾ by ¾ inch slabs. These slabs travel via a tempering tunnel, where a blast of air at 70° F. raises the block temperature from 0° to 15° F. in 4 minutes, to reciprocating cutters where sticks are sliced continuously from standing slabs of frozen fish at the rate of 480 per minute per cutter.

Conveying frozen sticks.--Fish sticks are conveyed to the main processing floor via a stainless bucket elevator, dumped onto an aligning table, and straightened by women that stand beside the aligning table or belt over which is fastened parallel strips of metal that guide sticks into lengthwise rows. From this table the fish sticks pass through a single batter curtain of automatically controlled density batter and through a curtain of breading. The fish sticks then travel through a shallow type fryer and cooler.

(over)

 ABSTRACTER: Martin Heerdt

3.237 CANADA SETS STANDARDS FOR FISH STICKS

Anonymous
Pan American Fisherman 10, 17 (July 1956)

Canadian producers of cooked and uncooked fish sticks must comply with certain mandatory standards put into effect June 7, 1956, in an amendment to the Fish Inspection Regulations. Any fish-sticks imported into Canada must also conform to these mandatory standards, of which these are the two main provisions:

1. "Fish sticks mean uniform, rectangular shaped portions of fish flesh which are coated with breading or batter and breading."

2. "Fish sticks shall weigh not less than one ounce each; (b) cooked fish sticks shall include a minimum of 66 2/3 % by weight of fish flesh; (c) uncooked fish sticks shall include a minimum of 75% by weight of fish flesh; and (d) fish sticks shall be free from defects and shall be of good merchantable quality."

These are mandatory standards as compared to the voluntary U. S. standards for grades of frozen fried fish sticks developed by the U. S. Fish and Wildlife Service in cooperation with the interested industry representatives.

 Reprinted in part

CONSUMER PREFERENCE STUDY

NEW FISH STICK LINE

PACIFIC COD FISH STICKS

FISH STICK STANDARDS

3.237

Prevention of moisture transfer.--Moisture transfer in the stick after it has been fried is prevented by rapid chilling and freezing. To obtain a unit for this purpose, the plant engineers converted a vertical cooler conveyor into a freezer for fish sticks. This freezer consists of a series of pivoted trays attached to two chains. As the fish sticks enter the freezer they are transferred from the inlet conveyor onto trays and are carried through 17 levels of the freezer without agitation. Refrigeration for the freezer is obtained from a bank of vertical refrigerant coils mounted along one side of the conveyor-freezer. Heat transfer is obtained with centrifugal fans that blow cold air horizontally over the pans at the various levels. Three of these conveyor-freezer units together provide 55 tons of refrigeration and maintain an air temperature of -25° F. and a temperature differential of 6° F. between the refrigerant and the freezer air. As each tray reaches the end of the freezing cycle it is tilted to allow the sticks to slide onto an exit conveyor that carries them to the packaging machine.

Mechanized packaging.--Cartoning of the fish sticks is accomplished by a 30 foot long machine that automatically gathers sticks into groups of five, opens the carton, inserts a folder, then inserts two rows of five fish sticks each . The interlocking type cartons are then mechanically closed, overwrapped, cased, and put into frozen storage.

3.237 (Cross Reference: 1.0111, 9.3)

3.236 (Cross Reference: 3.237, 3.26)

Neither breaded shrimp nor fish sticks replace other fishery products completely. Only a minority of the respondents indicated even partial substitution of breaded shrimp or fish sticks for other fishery products.

The frequency of serving fish or shellfish in the home increases in relation to the population density of the area. About half of all American families will serve fish or shellfish any time of year. The importance of seasons when more fish or shellfish is served is related in some instances to the population density. The increase in fish consumption during Lent is much more noticeable in larger cities than in small towns. Winter and spring are the principal seasons when more fish and shellfish are served in rural areas. In urban areas, Lent and the summer months are the principal seasons.

About 2 out of 3 rural familes do not eat fish or shellfish in restaurants, while it is quite common for urban families to do so. The percentage ordering these foods in restaurants tends to increase in larger cities.

A sample questionnaire and summaries of replies of questions are given in the back section of the leaflet.

Additional information about this survey may be found in Fishery Leaflet 424 which presents an analysis of the replies on a national and regional basis. An analysis of the replies as to various ages of the homemaker, the size of the family, the occupation of the head of the household and the family income is included in Fishery Leaflet 426.

3.237 (Cross Reference: 1.5)

Table 1 - Scale of Organoleptic Ratings

Description of Flavor and/or Odor of Fish Sticks		Organoleptic Rating
Whole Fish Stick	Component Parts[1/]	
Normal, characteristic of fresh product; no off-flavor or off-odor.	Normal, characteristic of fresh product; none to trace off-flavor or off-odor; barely noticeable.	Good (Grade A)
Lacking normal flavor or odor of fresh product; none to slight off-flavor or off-odor; barely noticeable.	Lacking normal flavor or odor; slight to moderate off-flavor or off-odor; definitely noticeable but not objectionable.	Reasonably Good (Grade B)
Slight to moderate off-flavor or off-odor; definitely noticeable but not objectionable.	Moderate off-flavor or off-odor; definitely noticeable; objectionable in localized areas only.	Fair (Substandard)
Strong or objectionable off-flavor or off-odor; distasteful but not repugnant.	Strong or objectionable off-flavor or off-odor; diffusing throughout adjacent tissue.	Poor (Out of Grade)

1/ Breading, dark meat (including the layer of skin fat), and light meat. (Each of these parts is judged separately and the rating is on the basis of the worst condition observed.)

3.237 QUALITY VARIABLES PINPOINTED FOR FISH-STICK MAKERS

Lirot, Stephen J. and Nickerson, John T. R. (Massachusetts Institute of Technology, Cambridge, Massachusetts)
Food Engineering 28, 88-90, 189 (June 1956)

Objective.--The object of this study was to learn how coating ingredients and processing affect the quality of frozen precooked fish-sticks.

Experimental.--Rice-wheat, rice-soya, rice-corn, rice, corn, and rice gluten flour mixtures were used in making batters for fish sticks. Flour batter solids and egg yolk content of the batters were varied to determine their effect on fat absorption and color development. Guar gum in amounts ranging from 0 to 0.5 percent was added to some of the batters to test the effect of viscosity on batter pick up.

Liquid batters made from dry solids and water were mixed for 2 minutes in a Waring Blendor. Frozen (uncooked) cod sticks, 3.8 by 1.0 by 0.5 inches and held in a wire basket, were dipped for 15 to 25 seconds in batter at 55 to 60° F. and drained for 10 seconds. Battered sticks were breaded by rotating them 10 times with breading in a breading jar. Battered and breaded sticks were fried in a thermostatically controlled fryer for 45, 90, 120, and 150 seconds at either 375° F. or 400° F. and cooled in air at room temperature.

Stick color, hue, and shade were measured in a spectrophotometer with a reflectance attachment using light of 500, 550, 600, and 650 millimicrons (mμ) wave length. Color shades obtained by frying the sticks were scored by a 23-member panel for increasing color according to ratings of 1 to 5. Viscosity of the batter was measured at 70° F. with a Brookfield synchro-electric viscosimeter. Total

(over)

ABSTRACTER: Martin Heerdt

3.237 REDUCTION OF DEHYDRATION IN FROZEN FISH-FILLET BLOCKS
TECHNICAL NOTE NO. 33

Holston, J. A. (Fishery Technological Laboratory, East Boston, Massachusetts)
Commercial Fisheries Review 18, 14-15 (June 1956)

During 1955, a total of 48 million pounds of frozen fish fillet blocks, valued at over 9 million dollars, were produced. Greater attention to the maintenance of quality is necessary if the production of this item is to retain its importance in the fishing industry.

Elaborate packaging procedures have been developed to minimize dehydration losses in fishery products for the finished market, but only the most primitive methods of protection have been applied in the frozen fish-fillet block industry. As a consequence of this practice, a serious dehydration problem was found to exist when representative lots of fish blocks were subjected to grading according to the proposed standards for frozen fish-fillet blocks.

Fiber-cartoned blocks in storage have shown marked dehydration in as little as three months. The spongy, dead-white appearance of the exposed surfaces became progressively more pronounced as storage continued. After 5 months of storage, the dehydration extended from 1/8 to 1/4 inch into the product. The flavor and texture of such blocks when cooked, and of products prepared from them, was tough, dry and flavorless. A loss in moisture of as little as 2 percent of the weight of the stored product has been found to adversely affect the flavor and texture of the product.

Even a slight degree of added protection was found to lengthen storage life to a considerable extent. A sheet of moisture-vaporproof cellophane placed on the surface of the block of unfrozen fillets and extending over the sides of the container to be locked into place by the cover, effectively

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.237 ENRICHED, CRUNCHY BREADING ADDS HOME-MADE LOOK TO CONVENIENCE FOODS

Anonymous
Food Processing 17, 26 (July 1956)

Extra-dry bread crumbs made from a nationally distributed bread are offered to processors as well as to the housewife. Crumbs impart attractive, hand-dipped, home-style appearance and add nutritional value since bread itself has been enriched. Crumbs are twice sterilized, once in baking process and again when subjected to "toasting" temperatures of 400° F. No change is required in batter dips currently used or in machinery already in service.

Composition of Bread Crumbs

Average analysis per 100 gm			
Moisture	7.0 gm	Calcium	119 mgm
Protein	12.1 gm	Phosphorus	118 mgm
Fat	5.8 gm	Iron	4.7 mgm
Ash	2.7 gm	Thiamine	21 mgm
Fiber	.3 gm	Riboflavin	17 mgm
Carbohydrate	72.1 gm	Niacin	3.8 mgm
	Calories	389	

See illustration, over.

(over)

Reprinted in whole

3.238 USE OF ANTIOXIDANT IN PAPERBOARD

Doyle, M. E.; Sullivan, R. D.; and Booth, H. G.
Modern Packaging 29, 119-123, 195 (July 1956)

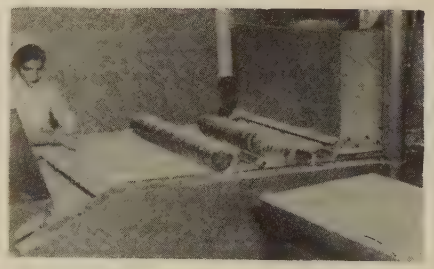
The addition of antioxidants to the paperboard used for food cartons has been subject to increasing study during the past few years. When foods containing fats or oils are packaged in paperboard containers, a certain migration of the fatty material into the paper occurs. Because of the greatly increased surface area exposed under such conditions, the fat oxidizes rapidly and offensive odors are developed. Even though the food products in the package may still be sweet, the stale or rancid odor of the package leads to customer rejection.

Physical modification of the package offered a partial solution, but such modifications are costly and not entirely satisfactory. The most promising approach has resulted from investigations which demonstrated that the incorporation of an antioxidant into the paperboard food carton protected the migrated fat from oxidation.

Many materials have been suggested for use in carton stock. They include: pyrogallol, citric acid, galacetonin, hydroquinone, and butylated hydroxy anisole. In all cases their use resulted in some improvement in shelf life. Recently a specially purified grade of 2,6-di-tertiary-butyl-4-methyl phenol, received the approval of the Food and Drug Administration as an antioxidant for foodstuffs. Carton stock containing this substance has proven to be particularly effective in preventing the development of rancid odors.

ABSTRACTER: Kathryn L. Osterhaug

3.237



Breading fish sticks with crumbs made from enriched bread at major New England fish processing plant

3.238 (Cross Reference: 3.4, 4.64, 6.14)

3.237

solids and fat content were determined according to the methods of the Association of Official Agricultural Chemists.

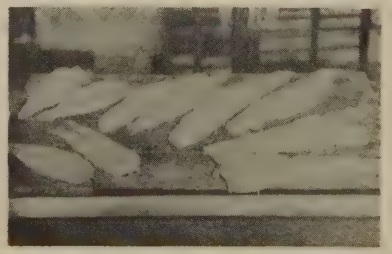
Results. --Correlation between the organoleptic and spectrophotometric methods of evaluating the color-hue of fish-sticks at wave lengths 600 mμ and 650 mμ was extremely good. Fish-stick shades of color in the middle of the range (neither too light nor too dark) were preferred.

Loss of weight or moisture as a result of frying increased significantly as frying time at both 375° and 400° F. was prolonged. These moisture losses appeared in the finished fish-stick as an increase in total solids content. Frying time had a greater influence on fat content and fat absorption than did frying temperature.

The amount of overall batter and breader pickup by the uncooked fish-sticks varied lineraly with the logarithm of both batter viscosity and percent frying weight loss. As overall pickup decreased, frying weight loss increased. Overall batter pickup ranged from 28.3 percent for rice flour to 65.2 percent for a rice-soya mixture with 30 percent batter solids. Above 3 percent egg yolk solids, an increase in yolk solids reduced the batter viscosity and the overall batter pickup of the uncooked fish-sticks. A batter with no egg solids permitted a slightly greater fat absorption and weight loss when the fish-sticks were fried than a batter containing 3 percent egg solids.

3.237 (Cross Reference: 3.238)

reduced dehydration during storage. Frozen blocks wrapped in heavy-duty aluminum foil have been held in frozen storage for over a year without noticeable dehydration.



Fillets of the type used in the manufacture of fish blocks.

3.238 PACKAGING IS BULWARK OF FROZEN FOOD QUALITY

Klein, Marian G. (The Marathon Corporation, Menasha, Wisconsin)
Frosted Food Field 23, 25-26 (July 1956)

Moisture loss.--The number one hazard in frozen food storage is moisture loss. Moisture loss is often referred to as dehydration, desiccation, or freezer burn. It occurs most frequently on improperly wrapped fish, meat and poultry.

Dehydration is objectionable because of:

1. Color changes - Dehydrated or desiccated foods develop a bleached, chalky, mottled appearance.

2. Flavor changes - Dehydrated protein foods lack juiciness and good taste. Flavor changes are more marked in fish, meat and poultry than in vegetables.

3. Texture changes - Protein foods, such as fish, poultry, meat and shellfish, which have become badly dehydrated show a definite increase in toughness. The dried protein tissues are altered so that they do not readily take up water again. Badly dehydrated protein foods are tough, dry, and spongy in texture.

4. Loss in weight - Dehydrated foods show high losses in weight (see table 1).

Improperly packaged poultry presents this desiccated appearance after nine month's storage at 0° F.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.26 HOW TO TRUCK FROZEN FOODS

Green, M. B.
Refrigerating Engineering 64, 44-45, 86, 88, 90, 92, 94 (November 1956)

Ideal trailer.--The ideal trailer for frozen foods has five characteristics:

1. The superstructure or metal structural members do not penetrate the insulation and bypass or nullify the effect of insulation installed between the metal members.

2. The exterior skin is sealed against moisture-vapor transmission by the use of a moisture-vapor barrier material. This is very important in trailers because moisture trapped in the insulation can amount to thousands of pounds, nullify the value of the insulation, and reduce the payload. The moisture problem was recently brought to the attention of one trailer manufacturer when one of their new reefers was put on test. The trailer-reefer which had been in operation only a short time, required three days of baking in a test room to dry out the insulation in the walls.

3. The insulation material is impervious to the effects of moisture and of a thickness to meet the temperature requirements and operating conditions.

4. The inner wall lining is impervious to moisture, and,if not an insulator is at least a poor conductor and is resistant to abrasion and shock.

5. Provision is made for the proper distribution and circulation of air. If the evaporator is in the upper nose of the trailer, a ceiling duct should carry the air down the length of the trailer and distribute it to the side and rear walls. Diagonal stripping is placed on the side walls to provide air

(over)

ABSTRACTER: Martin Heerdt

3.26 TRUCK-REFRIGERATION UNIT UPS DELIVERY EFFICIENCY

Anonymous
Food Engineering 28, 119-120 (June 1956)

Automatic temperature control, automatic defrosting, light weight, and low maintenance are the advantages of a new hydraulic fluid powered truck-refrigeration unit. The new unit is designed for insulated truck bodies and is operated by the truck engine. These units are especially suited to wholesale delivery of frozen and perishable foods.

Units are manufactured either with a straight hydraulic drive or with a combination hydraulic and standby electric motor drive. These units are available for all sizes and temperature requirements of truck bodies.

Power for the refrigeration unit is derived indirectly from the truck engine as follows: spare horsepower developed by the truck engine actuates a hydraulic pump which is either belt-driven from the crankshaft or gear driven through a power take-off transmission. The hydraulic pump compresses a hydraulic fluid that is stored under pressure. This hydraulic fluid is used to operate a hydraulic motor that drives the refrigeration unit. The hydraulic motor operates at a constant speed irrespective of whether the truck engine is idling or running at top speed, therefore the refrigerative capacity of the unit does not vary.

Produce in the truck body is air cooled by forced circulation of air. Heat in the air is given up to the cooling coil and the cold air is returned to the truck body and blown onto the produce. As the cold air picks up heat it moves downward, under, and around the produce and returns to the cooling coil.

ABSTRACTER: Martin Heerdt

3.5 SALTING METHODS AND EQUIPMENT - DRY SALTING

Anonymous
La revue de la conserve 10, 58 (October 1955) (Paris)
World Fisheries Abstracts 7, 41 (July-August 1956)

A machine for salting pilchards aboard fishing boats, used in the Caspian Sea fisheries (Russian), facilitates the work of fishermen, speeds up the salting of the fish and improves the quality of the product.

The system (see over) includes, on both sides of the boat: a tank (1) for receiving the fish, a device for measuring the amount of fish (7), a mixer (6) and a screw conveyor (5). In the middle of the ship are 2 bins for salt, inside of which are the salting devices (3). The tanks can receive 150 kg. (330.7 lb.) of pilchards; there is a drain for water in the bottom of the tank and an opening through which the fish go to the measuring device. The measuring device delivers the fish by lots to the mixer's drum, composed of a casing and a cylinder fitted with 4 paddles. The mixer regulating the mixing of fish and salt, is composed of a conical drum inside of which there is a spiral metal comb. Each vertical salt bin has a 100 kg. (220 lb.) capacity; it is made of metal with, at the bottom, a fitting for the end of the screw-conveyor. The salting devices are made of 2 metal blades. Salt goes from the bins into the mixers through screw conveyors encased in metal tubes at the end of which are slots for delivering salt. Fish coming through the opening in the bottom of the tank fill the space between the 2 blades of the measuring device which rotates and delivers them to the mixers. Salt is spread through the slot of the tube containing the screw and is evenly mixed with the fish. Then they are put in a box on the deck. There is only one electric motor driving the whole mechanism. The speed and salt measuring are adjusted by changing the gear. The experimental machine was tried during winter and summer 1954. Each revolution of the screw delivers 500 g. (1.1 lb.) of salt to the

(over)

Reprinted in whole

PACKAGING FROZEN FOOD

TRUCK REFRIGERATION

TRUCKS FOR FROZEN FOODS

MACHINE SALTED PILCHARDS

3.26

3.5

mixer; each revolution of the measuring device brings 4.1 kg. (9 lb.) of fish to the mixer. The yield is 36 quintals/hr. of fish plus salt.

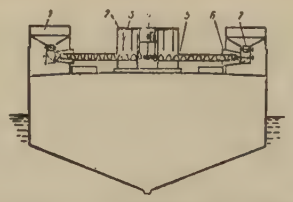


Fig. 1. Position of the machine on a fishing boat.

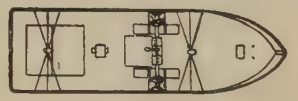


Fig. 2 Machine for salting pilchards.

3.238 (Cross Reference: 3.249)

Oxidation.--Another hazard to food in frozen storage is oxidation. In this action, oxygen from the air invades the frozen food packages and mingles with the food fat cells, resulting in the formation of new chemical compounds (fatty acids, aldehydes, and ketones) that have a disagreeable taste. This off-taste is known as rancidity.

In general, the higher the fat content of the food product, the more vulnerable it is to oxidation. Not only the amount of fat but also the type of fat plays a role in the development of rancidity. Fish, meat, and poultry are especially susceptible to oxidation.

Rancidity can be retarded by packaging food products tightly with materials that are good oxygen barriers. It is also important to avoid any small air spaces inside the package inasmuch as even minute quantities of air are sufficient to allow damaging oxidation to take place.

Table 1
Loss in Weight of Food Stored at Zero F. for 9 Months

Type Package	Type Food	Wt. Loss, %
12 oz. waxed carton, no overwrap	Peas	15
12 oz. waxed carton, waxed paper overwrap	Peas	0.4
1 lb. heavy waxed carton, no overwrap	Haddock fillets	13
1 lb. heavy waxed carton, waxed paper overwrap	Haddock fillets	1.7
2½ lb. waxed carton, no overwrap	Cut-up frying chicken	16
2½ lb. waxed carton, waxed paper overwrap	Cut-up frying chicken	1.8

3.26

circulation and prevent the cargo from touching the walls. The diagonal strips will prevent small containers from falling between the strips and blocking circulation.

Envelope of air.--If the air is moved over the top of the load and down the side walls, provision must be made for the return of the air from rear to front under the load. This can be accomplished by deep-groove corrugated flooring or by spacers and racks that raise the cargo off the floor. When loaded, the cargo should be encased in an envelope of air.

Proper loading.--Even if the refrigeration unit is the best that can be obtained and the trailer manufacturer has turned out an acceptable unit, the whole effort can be lost by improper loading and handling. The main object of arranging the load should be to subject as much as possible of the load surface to the cold air. Odd-shaped containers as they are loaded usually provide natural air passages. Straight sided containers, however, present a definite problem because of the tendency to pack them tightly together. If possible, the containers should be loaded in a staggered arrangement, or batten strips should be laid down between rows to form ducts.

Standby units.--Frequently, a truck loaded with perishables will stand for hours or days at a terminal. For this reason, electric power has been added to most refrigeration condenser units. If the unit is plugged into an electric power source, it will defrost automatically and hold the required temperature indefinitely.

Small truck refrigeration.--Small truck units must be low in first cost, must be economical to operate, and must work with a minimum of attention from the driver. The hydraulically driven system meets these requirements and uses the truck engine as the prime mover. A specially designed hydraulic pump driven by a power takeoff is connected by hoses to a hydraulic motor located in the refrigeration unit. This pump is designed so that the unit motor operates at a constant speed regardless of the truck engine speed and gives full compressor capacity even if the engine is idling. These units also may be obtained with automatic defrosting and standby electric power.

3.4 SMOKE-CURING SALMON AND TROUT IN THE TORRY CONTROLLED KILN

House, C. T. and Cutting, C. L. (Torry Research Station, Aberdeen, Scotland)
Food Manufacture 31, 427-435, 439 (October 1956)

Experimental.--Smoked salmon similar to that available on the retail market was produced experimentally in the 40-stone capacity Torry kiln to gain information about the process.

Initial preparation.--Whole salmon were eviscerated and smoked as kippers or as fillets. Kippers are from eviscerated salmon that have been split from the dorsal side with the head left on, but with the eyes, gills, and most of the backbone removed. Fillets or sides are the two sides of the salmon cut carefully from the bone so as to retain the belly walls and shoulder bones. In preparing salmon for smoking the yield by weight is about 84 percent for kippers and 75 percent for sides unless the salmon are ready to spawn. With 12 pound size spawning salmon the yield of sides by weight is about 50 percent for females and 65 percent for males.

Salting.--Best quality fine dairy salt gave good results in both dry salting and pickling without the need for other ingredients. In dry salting the salt was rubbed lightly into the flesh and transverse scores or cuts on the skin side of each salmon. The first salmon or salmon side was then laid skin down on a layer of salt in a box, covered with salt, and the process was repeated with sides placed alternately head and tail. Weights were placed on top of the salted salmon. Dry salting causes liquor to be extracted from the tissue. This liquor forms a brine if it is allowed to collect and ultimately flows back into the fish, which after an initial decrease in weight, recovers the weight lost. However, if the brine is allowed to drain away, the weight of the fillets decreases by almost 30 percent and remains unchanged. If fish are salted by pickling in concentrated or 70 to 80 percent saturated brine, salt is absorbed more rapidly than it is absorbed by dry salting. With dry salted herring there was an

(over)

 ABSTRACTER: Martin Heerdt

3.4 FIRELESS SMOKEHOUSE SMOKER

Anonymous
Food Engineering 28, 65, 151 (June 1956)

A smoke generator of unique design was recently installed in the plant of a Chicago sausage company. Smoke is generated through the abrasion created when a weighted wooden log is brought vertically into contact with a horizontal high-speed rotating metal disk having eight broad teeth or carbonized steel blades.

Operation.--To operate the smoke generator, a hickory or other suitable wood log about 6 inches by 6 inches by 35 inches is placed in the unit and secured between a weight holder above the log and a floating spring holder beneath the log as illustrated (see over). The weight holder rides on eight ball-bearing wheels that are positioned directly on top of the log and is held in place by 4 vertical guide rods that are ¾-inch in diameter. Smoke density can be quickly controlled or changed to light, medium, or heavy smoke as desired by varying the number of weights applied to the weight holder. A 5-horsepower electric motor is used to drive the 9½-inch diameter 8-toothed, knife bladed disk at 1,750-rpm. through a vertical shaft coupling. Material that is abraded from the log is washed into a screened (¼-inch mesh) stainless steel catch pan and then into the floor drain.

Advantages.--The new smoke generator has the following advantages:

1. Smoke production can be stopped and started immediately.

2. The time required to fill a 21 car smokehouse to 100 percent smoke density is reduced from the 10 or 15 minutes required when burning sawdust in a smoke generator to 3½ minutes when abrading

(over)

 ABSTRACTER: Martin Heerdt

3.63 LIANA PRODUCING WAGERIZED SHRIMP ON FULL-TIME BASIS

Anonymous
Southern Fisherman 16, 15, 44 (November 1956)

Shrimps, dehydrated by a new process, are now being produced on a full time, pilot plant basis by a Texas corporation. By this method, 7 pounds of green shrimp tails are blanched, peeled, deveined, reduced to 13½ ounces in weight, and vacuum sealed in a standard "gallon" can. It is said that flavor and size are not affected.

These shrimp require no refrigeration while sealed, but refrigeration is recommended after the can is opened. The shrimp are reconstituted by soaking 12 to 15 minutes in either hot or cold water. A gallon of water is used to reconstitute a can of shrimp. After rehydration the shrimp are ready for immediate use in cocktails and salads, or may be fried or prepared in any manner in which peeled and deveined fresh shrimp are served.

The processing begins with blanching or cooking the green shrimp tails in boiling water. The cooked tails are then regraded, to assure uniformity of size, peeled, and deveined. The peeled shrimp are neatly arranged on metal trays, so that each tail is in contact with the metal, and blast frozen.

A close-up of the tray packing operation.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

4.61 THE EFFECT OF ANTIOXIDANTS ON FROZEN GROUND PORK

Neill, Jean and Page, Louise (Department of Home Economics Research, Montana State College Agricultural experiment Station, Bozeman)
Food Technology 10, 315-319 (July 1956)

Ground pork was divided into 8 lots and treated as follows: three groups contained 0.10%, 0.15%, and 0.30%, respectively, of monosodium glutamate; three groups contained 2.5%, 5.0%, and 7.5%, respectively, of full-fat soybean flour; one group contained 0.02% butylated hydroxyanisole; and the last lot, a control, contained no treatment material. The lots were divided in half; one half was frozen raw, and the other was cooked prior to storage. Peroxide determinations were made at intervals up to 18 months of storage, and palatability tests were made at corresponding intervals up to 12 months.

The cooking process alone markedly retarded oxidation in all groups except those with added soybean flour. There was little difference between the soy-treated pork stored raw or that cooked before storing. Peroxide numbers showed no significant differences among the three levels of MSG or of soy.

Although soybean flour was an effective inhibitor of peroxide development in both raw and cooked pork, its acceptability rating on organoleptic tests was much lower than the control in all cases except one: when stored raw, samples with soy at 2.5% were about equal to the control in acceptability.

MSG received the highest ratings on palatability judgments in both the pork stored raw and that cooked before freezer storage. Chemical determinations, however, indicated more pro-oxidant than antioxidant activity on the part of MSG, the peroxide values increasing very rapidly after the twelfth month of storage.

(over)

 Authors' summary

SMOKED SALMON FROM TORRY KILN

FIRELESS SMOKE GENERATOR

FREEZE-DRIED SHRIMP

ANTIOXIDANTS IN FROZEN GROUND PORK

3.4

a wooden log.

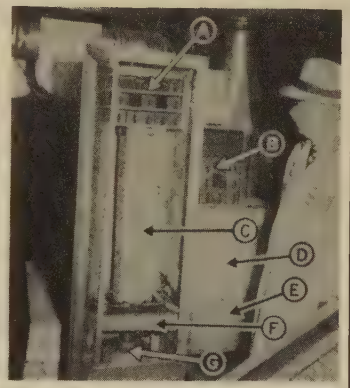
3. A built-in water-wash system makes manual cleaning of the generator unnecessary because wood ashes, tars, and resins are flushed away, whereas conventional smoke generators require daily removal of ashes, and their smoke houses require weekly scrubbing with soap and water for the removal of tars and resins.

4. The smoke generator occupies a space only 3-feet by 3-feet by 6-feet high.

5. Cold water spray-washed smoke is produced that causes very little irritation to the human eye.

6. Only 3 minutes is required to load the generator with a log, and a single hickory log with 65 pounds of weight applied to it will generate smoke for 18 hours.

7. The chance of fire from the smoke generator is negligible.



Closeup of compact friction-principle generator. (A) is 3-shelf weight-holder, (B) weight storage cabinet, (C) 3-ft. log, (D) water-spray unit, (E) 5-ply screen filter, (F) enclosed rotating abrading disk and perforated water pipe, and (G) motor. Unit has smoke coming at the press of a button, is easy to maintain.

4.61

BHA had a significant antioxidant effect on pork stored raw, and in pork cooked prior to freezing it was the most effective of the treatments in retarding oxidation. In acceptability, it was either equal to or better than the control.

Storage time had a significant linear effect upon peroxide development, the values increasing as storage time increased. There was a slight lowering of acceptability ratings as storage time increased, but this effect was not statistically significant. After 12 months of storage, the pork was essentially as acceptable as when fresh.

3.4

initial loss in weight within a few days after salting. In dilute brines, however, herring gained as much as 30 percent in weight after 1 week. The rate of water extraction during dry salting roughly parallels the uptake of salt, but is twice as fast in the tail half as in the thicker half. Scoring the skin of the salmon at the thickest part of either the split fish or the sides, speeds up salt penetration into the sides.

Smoking.--Kipper or split salmon were hung for smoking with a piece of twine tied to the tail and a skewer was put through the flesh at the widest part of the salmon to hold it open. Sides were hung with a loop of a piece of twine passed through the flesh beneath the pectoral fin. Good results also were obtained in the Torry horizontal flow kiln with the salmon side laid skin side down on wire mesh trays. Fires kept burning with oak or similar hardwood chips and sawdust gave good smoking results as did the addition of a small proportion of juniper wood which was burned to add a desirable aromatic flavor. Low fires with a smoke temperature not exceeding 80° F. were used initially in the Torry kiln for an average "mild" cure. After 6 or 7 hours the temperature was raised gradually to 85° F. for a few hours depending on the size of the fish or sides. Finally, the temperature was raised during the twelfth hour to 100° F. The moisture loss from sides of an 8 and a 15 pound fish was respectively, 0.7 and 1.0 percent per hour over a 12 hour period of smoking.

Pickle-salted salmon required a preliminary drying in circulating air in the kiln at room temperature before they were dry enough to be smoked. As with dry salted salmon, the total loss of weight from salting and from smoking was about 17 percent for an attractive mild cure that will keep fairly well and slice easily. About 48 hours were required to obtain the same type of cure in an ordinary natural draft smoking kiln.

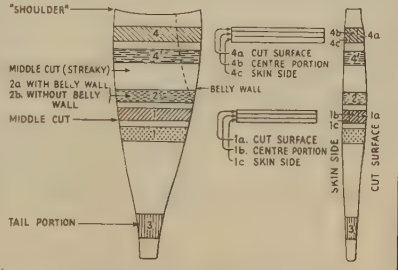


Fig. 1. Side of salmon (diagrammatic) showing samples for analysis.

3.63

The frozen shrimp are placed in drying chambers where the meats are defrosted and dehydrated by a sublimation process in which moisture is converted to gas, drawn off in a vacuum, condensed by refrigeration, and disposed of. The still-warm dehydrated meats go immediately to an air-conditioned packing room where they are weighed and packed in vacuum sealed cans.

Demand for the shrimp prepared by this patented process already exceeds the capacity of the pilot plant, 4,000 to 6,000 pounds of fresh shrimp daily. Only institutional packs have been produced thus far.

Peeling and deveining the cooked shrimp.

Dehydrated shrimp meats packed in a rack truck.

4.12 SOUTH AFRICAN PILCHARD OIL. 5. THE ISOLATION AND STRUCTURE OF AN EICOSAPENTAENOIC ACID FROM SOUTH AFRICAN PILCHARD OIL

Whitcutt, J. M. and Sutton, D. A. (National Chemical Research Laboratory, Pretoria, South Africa)
The Biochemical Journal 63, 469-475 (July 1956)

This paper reports on the isolation of an eicosapentaenoic acid obtained from South African pilchard (Sardina ocellata) oil.

Experimental.--Separations were made with the mild methods of (1) lithium salt-acetone segregation, (2) urea-complex fractionation, and (3) molecular distillation. A concentrate of the required fatty acid was prepared and then isolated by reversed-phase partition chromatography.

Isolation.--Fraction 5 from the molecular distillation of the unsaturated-acid concentrate absorbed 4.87 moles of hydrogen per equivalent over a Pd-$BaSO_4$ catalyst. Most of the hydrogenation product appeared in one large peak corresponding to a C_{20} saturated acid. Reversed-phase partition chromatography of fraction 5 yielded sub-fractions I, II, and III.

Eicosapentaenoic acid was recovered from fraction II as a clear, faintly yellow oil of melting point -54.4° to -53.8° C., refractive index n_D^{25} 1.4977. Other general properties found were as follows: 79.3 percent carbon, 10.2 percent hydrogen, 5.03 double bonds per molecule (hydrogen uptake over Pd-$BaSO_4$), an equivalent weight of 303, and iodine value of 412. The compound $C_{20}H_{30}O_2$ has 79.4 percent carbon, 10.0 percent hydrogen, 5.00 double bonds per molecule, an equivalent weight of 302, and an iodine value of 420. A Kuhn-Roth determination gave 0.75 carbon-methyl groups per molecule.

Hydrogenation product.--Chain-length analysis of the above hydrogenation product showed only C_{20}

(over)

 ABSTRACTER: Martin Heerdt

6.190 CALORIE-PROTEIN RATIO

Almquist, H. J. (The Grange Company, Modesto, California)
Feedstuffs 28, 14 (June 16, 1956)

Old ratio.--The calorie-protein ratio usually is obtained by supplying values for and making the calculations called for in the following equation:

$$\text{Calorie-Protein Ratio} = \frac{\text{Calories (per lb. of diet)}}{\text{Total protein (\% of diet)}}$$

1. Calories from total protein
2. Calories from carbohydrates
3. Calories from fat

However, if part of the protein is used for energy, item 1 must decrease because protein cannot fulfill both growth and caloric purposes at the same time. The original equation, therefore, accounts for only the usual concept of the calorie-protein ration

Caloric demand, however, is pre-eminent. An animal that is forced to choose will use protein to fill out caloric needs and use the remainder of the protein for growth. Some of the protein, in a ration, is always used in the production of energy. If most of the protein in the ration is to be used to produce growth, the additional calories must be derived from carbohydrate and fat. Substitution of protein with carbohydrate is somewhat self-limiting because both have the same caloric value. An increase of carbohydrate in the diet usually results in an equivalent decrease in the percentage of the protein in the diet or vice versa.

Use of fat.--Fat provides almost twice as much energy as carbohydrate or protein, therefore its

(over)

 ABSTRACTER: Martin Heerdt

6.15 TUNA VISCERA TO FORTIFY CONDENSED SOLUBLES

Anonymous
Pacific Fisherman 54, 16, 19, 21 (June 1956)

A tuna canning company in Southern California has pioneered in the development of fish solubles for use in poultry and animal feeds. The condensed fish solubles produced by a patented process is the water-soluble, vitamin-rich extract produced from defatted fish press-water that has been chemically treated and vacuum concentrated to 50 percent total solids.

In relation to the canning of tuna, fish solubles is derived from (1) the liquid produced during the pre-cooking of raw tuna, and (2) from the centrifugation of presswater recovered during the production of fish meal from tuna viscera. Because the manufacture of condensed fish soluble is so integrated with the production of fish meal and fish oil, it is not practical to describe only one phase of the operation.

Tuna scrap from the packing line is carried by floor screw conveyor and pick-up conveyor to the byproducts section. It then passes through a continuous pre-cooker that uses steam to cook out the oil. The cooked scrap then goes through a continuous screw press of 12½-ton hourly capacity.

Press liquor flows from the screw press into a sump and is pumped to a centrifuge after being strained through a fine sieve where fine meal particles are removed. After the oil has been removed by the centrifuge the defatted stickwater is pumped to the solubles department where it is mixed with the "cooker juice" from the tuna pre-cookers.

In the holding tanks a slight pH adjustment is made to coagulate the excess protein and to prevent

(over)

 ABSTRACTER: Kathryn L. Osterhaug

6.190 FISH MEAL - NUTRITIVE VALUE

Creac'h, P.
Bulletin d'information et de documentation de l'Institut scientifique et technique des peches maritimes (Paris) 1, 6 (1954)
World Fisheries Abstracts 7, 47 (July-August 1956)

To prepare fish meal, the fat or lean tissues of the fish have to be dehydrated after cooking and pressing to reach an 8 to 10% humidity level. For this purpose, different processes are used commercially; (1) high temperature 200° to 300° C. (392 to 572° F.) obtained by contact with hot gas, produced by a burner or a flow of hot air; (2) medium temperature 80° to 120° C. (176 to 248° F.) obtained with hot gas produced by a burner, the temperature of which is limited (Canadian process), steam or hot water circulating in a jacket; (3) low temperature by sun drying or vacuum drying.

Early research (1931-34) has shown that the menhaden meal flame-dried at a temperature between 260° and 315° C. (500° to 600° F.) produced a lower growth rate in rats than the same product dried at 93° C. (199.4° F.) by indirect steam. Furthermore, with meals dried at high temperatures, the gain of weight was lower and fertility was only 50%. Experiments conducted by the Fisheries Research Board of Canada (1951-53) on Leghorn chickens gave the same trend of results, the slight differences that arose being from different conditions of experiment, basal diet, etc. When heating the meal, the presence of oil causes prejudicial changes in the meal which affects the protein. These changes include a transformation which partially removes some indispensable amino acids such as lysine from being available to the animals. At the same time, there is a corresponding decrease of the digestibility and the biological value of the fish meal protein.

For some Canadian workers, the solution consists in supplementing the diet of fish meal dried at

(over)

 Reprinted in whole

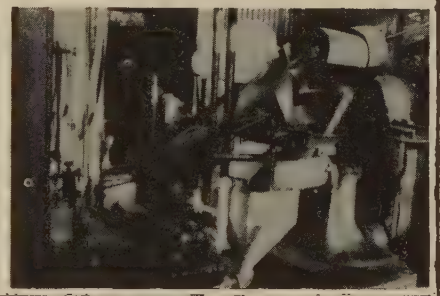
6.15 (Cross Reference: 1.1)

spoilage. The treated stickwater is pumped through a heat exchanger and then concentrated in special evaporators until hydrometer readings show that the solids content of the product is 50 percent.

Before the acidulated stickwater is submitted to concentration, it is fortified with ground tuna viscera. This raw material, which is removed from the tuna before they are precooked, contains the vitamin-rich liver and the digestive enzymes.

The visceral material is ground separately in the fish room and then added to the stickwater. By this method, a controlled enzymatic hydrolysis of the viscera takes place and fortifies the finished product with additional vitamins and growth factors.

A uniform finished product is insured by the use of a rigid quality control program. Condensed fish solubles is analyzed for solids, viscosity, ash, pH, vitamins, protein, fat and amino acids. Extensive blending is carried out before shipment to produce uniformity.



Here fresh tuna viscera is finely ground before being mixed with the acidified stickwater, where it undergoes controlled enzymatic hydrolysis, fortifying the nutritional values of the condensed solubles.

6.190

high temperatures with a mixture of B complex vitamins; even if the results are very good, this method is very expensive.

Sun drying and drying under shelters at low temperatures, below 40° to 45° C. (104° to 113° F.) are not to be recommended because: (i) in the first place insects are attracted and before a sufficient decrease of moisture has been reached, the conditions favor the growth of bacteria; (ii) a temperature below 80° C. (176° F.) does not destroy all the enzymes in the tissues. At a moisture level of 10% some enzymes can affect the keeping quality of the meal; and some enzymes, such as thiaminase, are growth inhibitors.

When direct-drying fish meal, heating over 80° C. is not recommended. If the raw material has previously been cooked (15 min. at 100° C. [212° F.]), all the enzymes seem to be destroyed.

The vitamins are more or less affected by heating but this is not a serious disadvantage, as the diet of the well-fed cattle usually includes more vitamins than the daily requirements obtained from other foods. The only cheap source of vitamin B_{12} being the fish meal, there is a problem because this vitamin is greatly destroyed by over-heating, as is shown in the following table:

Fish Meal Heating Temperature and Duration	Vitamin B_{12} in Dried Fish Meal (mg./kg.)
45° C. (113° F.)	0.44
150° C. (302° F.) 60 min.	0.25
150° C. (302° F.) 120 min.	0.12
180° C. (356° F.) 180 min.	0.077

4.12 (Cross Reference: 1.2, 4.13)

saturated acid with possible traces of C_{22} acid. Hydrogenation of 67 milligrams of the unsaturated acid over Adam's catalyst in ethanol followed by filtration of the product, extraction with pentane, crystallization once from pentane at -80° C. and drying under vacuum yielded a product with an equivalent weight of 315, and a melting point of 74.8° to 75.8° C. compared with an equivalent weight of 312 and a melting point of 75.35° C. for η-eicosanoic acid. This same product mixed with η-eicosanoic acid (melting point 75.0° to 75.3° C.) had a melting point of 74.8° to 75.1° C.

Additional structural confirmation studies.--The degree of purity of the acid was critically studied from the standpoint of oxidation products, ultraviolet absorption, alkali isomerization, infrared absorption, synthesis and degradation of heneicosapentaenoic acid, and model synthetic and degradative experiments with linoleic acid. The position of the double-bond nearest to the carboxyl group was unambiguously determined by means of an Arndt-Eistert synthesis in combination with a method of ozonolytic degradation, a procedure that probably has wide application.

6.190

use makes possible an increase in the energy content of the ration with less influence on the amounts of protein and carbohydrate source materials. With an increased amount of fat in the ration, higher levels of protein can be made to function as protein for growth rather than for energy. As more of the protein in the ration becomes available for growth, the importance of the amino acid balance of that protein increases.

New ratio.--The protein content of a ration can be increased considerably at the expense of carbohydrate without changing the energy content or obtaining improved growth. Growth will improve only if the protein present or a higher level of protein is made available for use as protein by replacing some of the protein that is being used to produce energy with a more concentrated form of energy such as fat. The true calorie-protein ratio-equation, therefore, should be expressed as follows:

$$\text{Calorie Protein ratio} = \frac{\text{Calories}}{\begin{array}{l}1.\ \text{Protein used for energy}\\ 2.\ \text{Carbohydrate}\\ 3.\ \text{Fat}\end{array}}$$

$$\overline{\qquad 4.\ \text{Protein used for growth}}$$

If protein used for energy is $\frac{1}{4}$ of the total protein then protein used for growth is $\frac{3}{4}$ of the total protein.

This ratio cannot be calculated in practice because the amount of protein used for energy cannot be estimated easily. Protein used for energy may be related to urinary nitrogen. A clear concept of the factors involved is of value, however, even if a practical calculation cannot be made.

6.3 SEAWEEDS COLLOIDS: $10 MILLION NOW--AND GROWING FAST

Idson, Bernard
Chemical Week 79, 57-80 (July 21, 1956)

I

The author lists the principal firms making seaweed colloids in the United States. These firms now produce per year about 5.3 million dollars worth of algin and algin derivatives, 4.5 million dollars worth of carageenin, and 0.5 million dollars worth of agar.

Seaweed colloids are in competition with (1) gelatin, (2) methyl cellulose, (3) carboxylmethyl cellulose, (4) gum arabic, (5) gum karaya, (6) gum tragacanth, (7) starches, (8) pectin, (9) polyvinyl pyrrolidone, and (10) polyacrylamides.

The seaweed colloids are used as (1) thickeners, (2) humectants, (3) coagulants, (4) bulking agents, (5) flocculation agents, and (6) antibiotic carriers.

The costs per pound for the various colloids are as follows: (1) algin, $1.25; (2) carrageenin, $1.25; (3) agar, $3.75; (4) pectin, $1.60; (5) gelatin, $0.80; (6) cellulose ethers, $0.50; (7) tree gums (arabic, karaya, and tragacanth), $0.25; and (8) starches, $0.07 to $0.12. The price per pound, however, is not the only factor in determining the competitive position of a colloid. The relative amounts of the colloid that are needed to perform a specific function and the special properties of the colloid are also important factors.

Seaweeds are classified according to color: (1) brown, (2) red, (3) green, and (4) blue-green. The colloids are obtained only from the brown and the red seaweed. The chlorophyll of the brown and red seaweeds is masked by other pigments. Algin is obtained from brown seaweed, and agar and carrageenin are obtained from red seaweed.

The seaweed colloids are polysaccharides. Nearly all are anionic polyelectrolytes with negative radicals on each repeating polymer unit. They apparently occur in mixtures of two or more kinds of

(over)

 ABSTRACTER: F. Bruce Sanford

6.3 THE PREPARATION OF SODIUM ALGINATE FROM ROCKWEED

Vincent, D. L. (Atlantic Regional Laboratory, Halifax, Nova Scotia)
Canadian Journal of Technology 34, 220-226 (July 1956)

Sodium alginate is usually extracted commercially from various species of Laminaria, Macrocystis, and Nereocystis. However, it may also be extracted with added difficulty from the common rockweeds Fucus vesiculosus and Ascophyllum nodosum, but the resulting products are not of such high grade and the yields are smaller.

Purpose.--The purpose of this study was to learn whether a sodium alginate of sufficiently good quality to meet the requirements of an industrial grade of alginate could be readily extracted from local rockweed.

Material.--Samples of Fucus vesiculosus and Laminaria digitata were obtained during August and September at Halifax, Nova Scotia, rinsed twice with tap water, air dried at 20° to 25°C. and ground in a Wiley mill to pass through a 40 mesh sieve.

Experimental and results.--Much of the color was removed from the weed during extraction with lime water without any other special treatment. Lime water extraction was also shown to be desirable in other ways. Considerable color remained in solution when the alginate was precipitated as calcium alginate. However, additional color could be dissolved out if the free, freshly prepared, moist alginic acid was washed extensively with ethanol. The alginic acid that resulted from extensive washing with ethanol was ivory in color, whereas the alginic acid that resulted without washing with ethanol was a pale brown in color. In contrast, the alginic acid from Laminaria digitata was nearly white without extensive washing with ethanol.

(over)

 ABSTRACTER: Martin Heerdt

6.3 NOVA SCOTIA PLANT MAKES INSULATION FROM EEL GRASS

Anonymous
Maine Coast Fisherman 11, 5 (December 1956)

In Shelburne County on the south shore of Nova Scotia is a plant which manufactures insulation from eel grass. This grass, a form of seaweed, is common along the coast of North America and very plentiful in southwestern Nova Scotia.

Eel grass has a number of natural qualities that make it suitable for insulation: (1) it will not burn or rot, chemically it contains silica, salt and iodine; (2) each blade of the grayish black material holds millions of minute air cells, this also makes it valuable as a sound deadener.

Eel grass grows from six to ten feet underwater off-shore. It breaks off and floats shoreward. During the summer months men gather it up in dories in the shallow water, bring it ashore and dry it in the open fields. The price paid varies from 21 to 30 dollars a ton depending on the distance the grass must be hauled to the plant at Sable River. Working on their own time between seasons, most fishermen can earn an extra three or four hundred dollars.

Eel grass was used for insulation in Europe many centuries ago, probably because it is a natural insulation that requires no processing except drying. Old homes being pulled down in New England and the Maritime Provinces have disclosed that the old settlers used eel grass insulation. After several centuries of use it is still in good condition.

In 1931 eel grass was hit by a blight and disappeared. It reappeared during the second World War and the plant in Nova Scotia was started at that time.

 ABSTRACTER: Kathryn L. Osterhaug

7.461 ESTIMATION OF CHLORIDE IN FOODS - A RAPID POTENTIOMETRIC METHOD

Anderson, K. W.
Food Preservation Quarterly 16, 36-38 (June 1956) (Australia)

Essentially, chemical techniques for the determination of chloride ion in foodstuffs are dependent upon the removal of interfering protein by methods involving ashing in the presence of magnesium or calcium acetate, or digestion with nitric acid, or by the selective extraction of chloride with solvents or protein precipitants and the subsequent titration of the protein-free chloride by classical methods.

The electrometric titration technique of Samson was employed. Two silver wires, which were electrolytically coated with silver chloride and functioned independently of a reference half cell, were utilized. The most satisfactory method of coating the silver wire with silver chloride consisted of electroplating for a few hours in a 5.0 percent solution of silver chloride in 10M ammonium hydroxide, using the silver wires as the anode and a carbon rod as the cathode.

The galvanometer employed was of the moving spot type with a coil resistance of 40 ohms, a critical resistance of 90 ohms, and a sensitivity of 25 mm per microampere.

The titration apparatus consisted of a 50 ml beaker of chloride solution into which were placed the insulated electrodes, a 5 ml microburette containing silver nitrate, and a microstirrer.

The sample to be analyzed was mascerated with about 80 ml of water in the microbowl of a Waring Blendor. The suspension was boiled to provoke protein coagulation, cooled and made up with water to a volume of 100 ml. The protein was separated by a convenient method and an aliquot of solution containing 2 to 20 mg of sodium chloride was transferred to the titrating vessel together with 30 to 40 ml

(over)

 ABSTRACTER: Donald C. Malins

6.3 (Cross Reference: 1.0111)

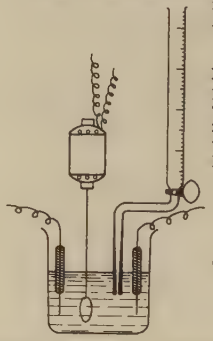
7.461

of distilled water.

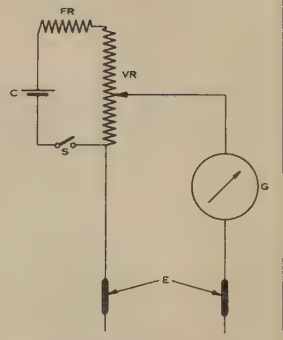
A slight potential difference was applied across the electrodes and current flow was adjusted until the galvanometer showed a full-scale deflection. The stirrer was turned on and 0.08M silver nitrate run in from the microburette.

Since the current was limited by the chloride concentration, it reached a minimum at the end point. The initial excess of silver ions caused a marked deflection in the galvanometer. Calculations are made by the use of the relationship: 1 ml 0.08M $AgNO_3$ = 4.68 mg NaCl.

Results obtained using this technique were highly consistent. Analyses of 10 replicate samples of homogeneous fish mass, each weighing two gms, did not differ by more than ±2 percent from the mean. A comparison of salt concentrations is given as determined by ashing and Mohr titration and the potentiometric method.



The titration apparatus.



Apparatus for coating the electrodes.

C, 1.5-volt dry cell; FR, 4000-ohm radio-type fixed resistance; VR, 0-1500-ohm radio-type variable resistance; G, sensitive galvanometer; E, electrodes; S, switch.

6.3

salts, with the relative proportions of these salts varying with season, locale, and species.

Agar.--The distinguishing features of agar are (1) relatively low sol viscosity that changes only slightly with temperature and (2) sharp transition temperature from liquid sol to gel. Agar is soluble only in boiling water.

Carrageenin.--On an equal-weight basis, carrageenin, which is extracted from Irish moss, forms weaker gels than does agar. With carrageenin, however, the variation in gel strength and the temperature of gelation is affected by the specific electrolytes (like potassium) present in the solvent. Gel properties are also affected by such materials as sugars, alcohols, and glycols. Gels formed with carrageenin are thermally reversible, but they melt at higher temperatures than those at which they form.

Carrageenin is sold largely on the basis of viscosity, which ranges from about 50 to 2,500 centipoises in a 2-percent solution. Hot water is needed to dissolve carrageenin, but long exposure to high temperatures can degrade the solution, the degradation being hastened by acidity. Carrageenin is normally extracted as a mixed salt of a galactan sulfate, having an average molecular weight of 200,000. The normal cations are sodium, potassium, calcium, and magnesium.

Algin.--Sodium alginate forms thermally irreversible gels with acids and with calcium salts. Algin salts of alkali metals, ammonia, and many organic bases are soluble in water. Alginates of most polyvalent metals are insoluble. At 1 percent concentration, alginate solutions range in viscosity from 100 to 2,500 centipoises. There is probably present in alginic acid a linear chain of 1,4 linked beta-D-mannuronic acid residues, although this structure probably applies to only a small part of the molecule. Sodium alginate ranges in molecular weight from 30,000 to 300,000.

II

Other subjects that are discussed by the author are (1) raw materials, (2) mechanized harvesting, (3) processing, (4) marketing, (5) research, and (6) perspective.

III

Reprints of this article are available from Chemical Week, Reprint Dept., 330 W. 42nd St., New York 36, N. Y., at 50 cents each.

6.3

A carbon-Celite column provided the most effective means of decolorization with adsorbents; however, adsorbent decolorization as a treatment method was only partially successful. Treatment with formaldehyde, a previously used commercial method, was of no value as a means of removing color. Most of the objectionable color developed as Fucus vesiculosus but not Laminaria digitata was extracted with sodium carbonate. The development of color during extraction could be prevented by prolonged extraction of the weed with methanol or ethanol before the weed was extracted with sodium carbonate. This method yielded nearly colorless alginates without any appreciable loss of viscosity.

Bleaching, as a means of removing objectionable color, required careful control to avoid excessive loss of viscosity. Very brief partial bleaching was somewhat satisfactory as a color removal method.

The method of purification that was used had a profound effect on viscosity, yield, and purity of the product. This is in agreement with earlier studies and confirms the tendency of alginate to depolymerize. Highest viscosities were obtained when purification was avoided and when low temperatures of extraction were used. A satisfactory sodium alginate with a viscosity of 3.7 to 8.2 centipoise can be prepared readily from Fucus vesiculosus in the laboratory without decolorizing treatment, but this plant is a more difficult to handle source of alginate than the kelps.

7.80 CHEMICAL CHANGES IN NITRITE-TREATED ATLANTIC COD FILLETS IN RELATION TO SPOILAGE ASSESSMENT

Vaisey, E. B. (Science Research Institute, Oregon State College, Corvallis)
Journal Fisheries Research Board of Canada 13, 559-567 (July 1956)

Fresh Atlantic cod fillets marketed in Canada usually contain up to 200 p. p. m. sodium nitrite that has been used as a preservative. Sodium nitrite suppresses the formation of trimethylamine which is sometimes used as an objective measurement of bacterial spoilage in cod and haddock. The object of the research reported here was to develop a convenient method for the routine measurement of spoilage in nitrite-treated cod fillets.

The following approaches were used in the search for such a method: (1) the determination of amino acids, (2) ammonia, (3) tyrosine value, (4) volatile acids, and (5) the rate of disappearance of nitrite in cod homogenates stored at 3°C.

Preparation of fish samples.--Commercially filleted cod less than one day old were used in the spoilage studies. Both whole fillets and fillet homogenates were used in the tests. In preparing the homogenates, fillets were minced, thoroughly mixed, and weighed into portions. To each portion was added in equal amounts either water or a sodium nitrite solution. Each was then blended in a Waring blendor, dispensed in about 45 gram amounts into petri dishes and stored at 3° C. Analyses were made periodically on samples immediately after preparation and sometimes again after 3-hours incubation at room temperature.

Tyrosine value determinations were made on the outside 5 mm. of whole cod fillets that had been dipped in nitrite during commercial processing.

Results and discussion.--Of the analyses made on the cod homogenates, only the following three gave promise of being useful in the determination of spoilage of nitrite-treated cod fillets: (1) tyrosine value, (2) volatile acids, and (3) the rate of disappearance of nitrite during storage at 3° C. The results

(over)

 ABSTRACTER: Kathryn L. Osterhaug

8.8 THE CONTROL OF FOREIGN MATERIALS

Walker, Niles H.
Modern Sanitation 21, 22 (June 1956)

Safeguarding the wholesomeness of a food product is solely the responsibility of plant management according to statements of the Food and Drug Administration. In order to be effective, food processors must have an overall knowledge of what can happen from the time ingredients are procured until the finished products reach the consumer. They must also adopt and pursue an effective program to eliminate any dangerous or unfavorable condition that might effect the product.

It is necessary to know how to select and store ingredients and how to keep the plants and warehouses free from insects, rodents, and contaminants of any kind. Necessary also is knowledge of how to maintain and clean processing equipment and an understanding of the correct procedures for processing the products being manufactured. Proper handling and storage of the finished product is also important.

"Foreign materials" means not only deleterious materials, but also those which are repulsive even though they may be entirely harmless. It is poor business for a food processor to offer for sale a product that might cause the customer to question the sanitary condition under which it was produced or handled.

The first step in preventing the introduction of foreign materials into the finished product is thorough and careful examination and analysis of all ingredients used in processing to be certain that the original ingredients are not carriers. A good evaluation can be made by the use of sieves, filters, microscopes and biological and chemical examinations.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

7.80 "TENTATIVE" METHOD FOR DETERMINING COATING CONTENT OF FROZEN FRIED FISH STICKS

Anonymous
Commercial Fisheries Review 18, 12 (September 1956)

Frozen fried fish sticks "shall contain not less than 60 percent, by weight, of fish meat" according to the voluntary United States standards published in the Federal Register, of July 21, 1956. A physical method to determine compliance with this requirement for officially graded products was developed at the Fish and Wildlife Service's Technological Laboratory at East Boston, Massachusetts. Considerable interest in this method, which permits rapid analysis, has been expressed by members of the industry in the New England area. Consequently, several demonstrations have been given to local industry groups.

The method of analysis is simple and rapid. It consists of the following steps: (1) weigh whole frozen stick, (2) dip stick in colored solution at room temperature for a specified time, (3) remove coating by scraping with a spatula, (4) weigh remaining fish meat, and (5) calculate percentage of fish meat content by the formula:

$$\frac{\text{(weight of fish meat after removing coating) X (100)}}{\text{(weight of whole frozen fried fish sticks)}}$$

Special procedures and precautions must be followed in order to obtain accurate results. A complete report on the procedure will be issued at a later date. For the use of fish stick producers who may be interested in the method as a quality-control tool, a limited supply of a "nonofficial" draft of the procedure has been prepared and copies are available from the Fishery Technological Laboratory, U. S. Fish and Wildlife Service, 61 Sumner Street, East Boston, Massachusetts.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

9.2 FISHERY TARIFF CONCESSIONS IN 1956 GENEVA NEGOTIATIONS

Sandberg, A. M. (Economics and Cooperative Marketing Section, United States Fish and Wildlife Service, Washington, D. C.)
Commercial Fisheries Review 18, 6-13 (August 1956)

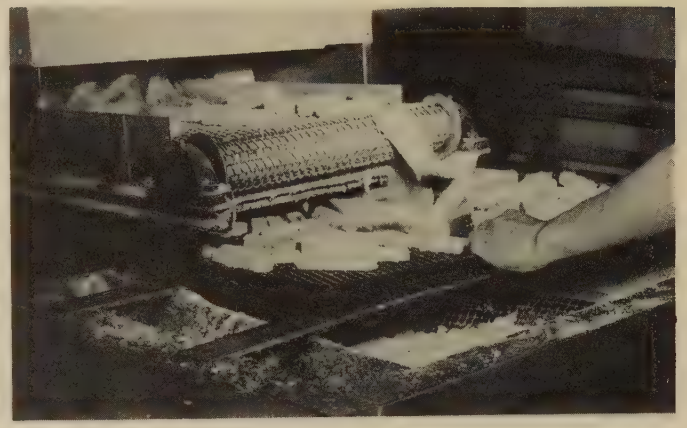
Trade agreements were negotiated by 22 of the 35 contracting countries of the General Agreement on Tariffs and Trade (GATT) during a conference that was held at Geneva, Switzerland, beginning on January 18, 1956. The conference was one of a series of multilateral meetings held since World War II for the purpose of exchanging reciprocal concessions on tariffs.

The United States obtained tariff concessions in these negotiations on overall exports valued at approximately $400 million. Products on which concessions were obtained by the United States cover a wide range of agricultural and industrial products. In direct tariff negotiations, concessions were obtained by the United States for certain fishery export commodities, including certain shrimp, salmon and oyster products. A description of these concessions is contained in table 1 (omitted).

In return for the concessions obtained, the United States granted concessions valued at $677 million. Among the fishery items on which tariff concessions were granted by the United States were certain fish and fish-liver oils, shark and whale oil, isinglass, pearl essence, certain canned smoked sardines, antipasto, fish cakes, canned herring snacks and tidbits, mild-cured salmon, and certain unboiled caviar.

 ABSTRACTER: Kathryn L. Osterhaug

7.80 (Cross Reference: 3.237)



Fish sticks coming off a conveyor belt system after they have been breaded.

9.2

7.80

of these analyses are illustrated in figures 1, 2, and 3.

It was found that the tyrosine values among cod fillets of similar history and nitrite content were too scattered to be of use as a spoilage index. Much smaller standard deviations occurred with gains in tyrosine values during 3-hour incubation at room temperature. These measurements appeared useful as spoilage indices as they were found to increase significantly at the storage age when the spoilage odors first became evident.

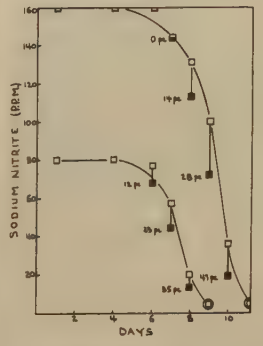


FIG. 1.—Sodium nitrite content of cod homogenate stored at 3°C.

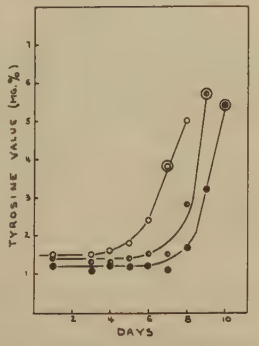


FIG. 2.—Tyrosine value of cod homogenate stored at 3°C.

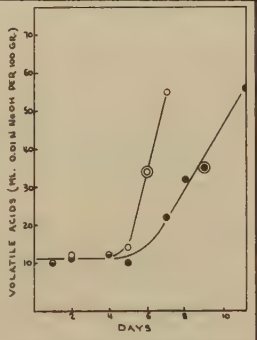


FIG. 3.—Volatile acid content of cod homogenate stored at 3°C.

Legend for Fig. 1-3

□—Before incubation.
■—After 3-hour incubation.
pc—Percentage decrease after incubation.
○—No sodium nitrite.
◐—100 p.p.m. sodium nitrite.
●—200 p.p.m. sodium nitrite.
○—Approximate time homogenate spoiled.

8.8 (Cross Reference: 3.18)

The second step is to police the product through processing and packaging. Carelessness in the selection, use, and maintenance of production equipment, and lack of interest of the workers are probably the greatest contributing factors to the presence of foreign materials in food products.

Food poisoning is a foreign materials problem that requires the attention of technically trained personnel. Food poisoning may be caused by chemicals, poisonous plants and animals, and microorganisms.

Zinc poisoning can be caused by acid foods prepared or stored in zinc-coated or galvanized containers.

Cyanide poisoning can be caused by silver polish, bitter almond, and fumigants.

Fluoride poisoning can be caused by mistaking sodium fluoride for white powdered ingredients or by unguarded use of this salt as an insecticide.

Cadmium poisoning can be caused by action of acid on cadmium-plated equipment.

Antimony poisoning can be caused by holding or cooking acid foods in some types of enamelware.

Arsenic poisoning can be caused by food contaminated by sprays or insecticides containing arsenic.

Lead poisoning can by caused by the use of lead pipes, utensils, or solder in contact with liquid or acid food.

Parasites (tape worms and trachina) can be carried by fish and meat.

Protozoa (entamoeba histolytica), a small one-celled animal, the cause of amoebic dysentry, can be carried by infected food handlers, polluted water, and flies.

Other foreign materials of interest to food manufacturers include bacteria, yeasts, and molds.

0.34 NAPHTHAQUINONE PIGMENTS IN THE TROPICAL SEA URCHIN DIADEMA ANTILLARUM (PHILIPPI)

Millott, N. (University of London, London, England)
Nature 178, 1185 (November 24, 1956)

0.35 STUDIES ON THE ENZYMATIC DEGRADATION OF AQUATIC ANIMAL TISSUES

Kashiwada, Ken-ichi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 7, 494-500 (1955) (English abstract, figures, and tables)

I. Ammonia formation in muscle.--Ammonia was found in a considerable amount when pyloric caeca extracts or proteolytic enzymes were used to digest aquatic animal tissues. Ammonia could hardly be observed when beef and whale meat were used as a substrate.

II. Ammonia formation in muscle.--If the pyloric caeca extract was added to peptone and protein hydrolysate or to muscle heated at 70°C. for 10 minutes and treated with alcohol or acid, no ammonia formation was perceptible.

0.5 THE RED HALOPHILIC BACTERIAL CONTENT OF SOME COMMON SALTS

Venkataraman, R. and Sreenivasan, A.
Journal of the Scientific and Industrial Research 14B, 606-607 (November 1955)

(Abstract of this article appears under 3.5 page 9 - December 1956)

0.6 RESEARCH BY THE NUMBERS

Anonymous
Chemical Week 78, 56 (March 31, 1956)

(Abstract of this article appears under 7.0 page 15 - August 1956)

0.6 NEWCASTLE-UPON-TYNE SECTION AND FOOD GROUP

Anonymous
Chemistry and Industry No. 19 (May 19, 1956)

1.01 FAO/ETAP INTERNATIONAL TRAINING CENTRE FOR FISHERY ADMINISTRATORS, DENMARK

Anonymous
FAO Fisheries Bulletin 9, 23-26 (January-March 1956)

(Abstract of this article appears under 9.7 page 19 - October 1956)

1.0112 LONG-LINE FISHING FOR DEEP-SWIMMING TUNAS IN THE CENTRAL PACIFIC, 1953

Shomura, Richard S. and Murphy, Garth L.
Special Scientific Report: Fisheries No. 157, 1-70 (September 1955)

(Abstract of this article appears under 2.12 page 3 - October 1956)

1.0141 ANNUAL REPORT TO THE DANISH FISHING INDUSTRY, 1955

Anonymous
Arsberetning fra Fiskeriministeriets Forsogslaboratorium for 1955 (Copenhagen) (1956)

1.0145 PIONER HANDED OVER TO MURMANSK CREW

Anonymous
World Fishing 5, 44-49, 64, 66 (February 1956)

(Abstract of this article appears under 2.118 page 7 - July 1956)

1.015 AN INVESTIGATION INTO THE KEEPING QUALITIES OF UNGUTTED FISH FROM THE TRAWLERS

Lantz, A. W. and Gunasekera, L. D.
Progress Reports Biological and Technological, Department of Fisheries, Colombo, Ceylon, No. 1, 1-4 (July 1955)

(Abstract of this article appears under 2.19 page 7 - October 1956)

1.015 COMMERCIAL UTILIZATION OF DOLPHINS (PORPOISES) IN CEYLON

Lantz, A. W. and Gunasekera, C.
Department of Fisheries Bulletin No. 3, 13-14 (1956) (Ceylon)

(Abstract of this article appears under 1.95 page 3 - January 1957)

1.015 (Cross Reference: 1.1)

FIGURES ON JAPANESE TUNA

Van Campen, W. G. (Translator) (Pacific Oceanic Fishery Investigations, Honolulu, Hawaii)
Pan American Fisherman 10, 12-13 (July 1956)

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

- - -

Editorial Clerk (Typist)--Gladys K. Chandler

1.2 FEEDING MACKEREL AND HERRING TO MINK KITS

Nielsen, K. Hovaard
Dansk Pelsdyraul 18, 223-225 (June 1955)

(Abstract of this article appears under 6.52 page 15 - January 1956)

1.2 THE CALCIUM AND PHOSPHORUS CONTENTS OF SOME FOREIGN AND DOMESTIC CANNED SARDINES

Da Costa, Antonio and Stern, Joseph A.
Food Research 21, 242-249 (March-April 1956)

(Abstract of this article appears under 8.42 page 23 - January 1957)

1.2 A STUDY OF THE EFFECTS OF AUREOMYCIN-CONTAINING SEA WATER AND ICES UPON THE STORAGE LIFE OF ROUND HERRING

Tomiyama, Tetuo; Kuroki, Shunichi; Maeda, Denki; Hamada, Seiji; and Honda, Akira
Food Technology 10, 215-218 (May 1956)

(Abstract of this article appears under 3.17 page 9 - January 1957)

2.111 CHANGE OF MECHANICAL PROPERTIES OF SOME SYNTHETIC CORDS BY THE COLD AND BOILING WATER IMMERSION

Koizumi, Takashi
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 8, 911-914 (1953) (English abstract and tables)

The length, the diameter, the tensile strength, and the elongation at breaking of various cords were measured: (1) "dry", (2) "wet" after 24 hours immersion in cold water, and (3) wet after 30 minutes immersion in boiling water. Amilan, Cremona, Mewlon, and Kanebian were changed in one or more ways by cold water immersion. All of the synthetic test cords were shortened by immersion in boiling water, whereas Cremona, Mewlon, and Kanebian cords were weakened in addition by immersion in boiling water.

2.111 DURABILITY OF NETTING THREADS AGAINST SELF-FRICTION I.

Miyamoto, Hideaki, and Takayama, Hiromitsu
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 3, 141-153 (1955) (English abstract, figures, and tables)

Dry threads of vegetable fibers, such as cotton and ramie, are very resistant to friction; but when moistened, their durability is reduced to about one quarter of the dry state.

2.111 NETTING AND ITS SECRETS (15) FIFTH ROW TAPERING

Jeffs, F. E.
World Fishing 5, 61-62 (November 1956)

2.00 (Cross Reference: 1.1)

STUDIES ON PUTREFACTION OF AQUATIC PRODUCTS XX. CONSIDERATION OF DIFFERENCE IN PUTREFACTION FOR VARIOUS KINDS OF FISH (3) INFLUENCE OF AUTOLYSIS ON PUTREFACTION

Simidu, Wataru and Hibiki, Sigeyuki
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 267-270 (1955) (English abstract and figures)

Very little difference has been found in the amount of putrefactive substances produced in either normal or autolysed yellow-tail. The amount of histamine produced in autolysed yellow-tail, however, was larger than the amount produced in normal yellow-tail. A larger amount of volatile base and histamine was produced in the autolysed mackerel than in normal mackerel.

2.02 STUDIES ON THE BIOCHEMICAL CHANGE IN THE FISH MUSCLE

Saito, Kaname and Hidaka, Tomio
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 8, 925-928 (1955) (English abstract, figures, and tables)

III. On the ATPase action of purified myosin fractions isolated from carp muscle.
IV. On the stability and ATPase activity of purified myosin fractions isolated from carp muscle.

1.30 A CHEMICAL STUDY OF THE OIL OF SALMON IN COLD STORAGE

Brocklesby, H. N.
Manuscript Reports of the Experimental Stations, Prince Rupert, B. C. (1929)

(Abstract of this article appears under 4.21 page 15 - January 1957)

1.33 TRANSPORT AND STORAGE OF FISH IN REFRIGERATED SEA WATER II. BACTERIAL SPOILAGE OF BLUE BACK SALMON IN REFRIGERATED SEA WATER AND IN ICE, WITH AND WITHOUT ADDED CHLORTETRACYCLINE

Steiner, G. and Tarr, H. L. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 104, 7-8 (November 1955)

(Abstract of this article appears under 2.114 page 3 - October 1956)

1.33 TRANSPORT AND STORAGE OF FISH IN REFRIGERATED SEA WATER V. SALT PENETRATION

McBride, J.; Murray, J. F.; and MacLeod, R. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations No. 104, 19-22 (November 1955)

(Abstract of this article appears under 2.15 page 7 - October 1956)

INDEX

Subject	Page No.	Card No.
Analysis, inorganic		
Chloride determination	21	7.461
Antioxidants		
Antioxidants in frozen ground pork	17	4.61
Antioxidants for salted salmon	29	4.61
Apparatus and equipment, laboratory and plant		
Color control	1	0.112
Asiatic fisheries		
Japanese tuna fishery	25	1.015
Chemistry and biochemistry, miscellaneous		
Naphthaquinone in sea urchin	25	0.34
Enzymatic breakdown of fish tissue	25	0.35
Composition, inorganic		
Fish stick standards	23	7.80
Composition, organic		
Eicosapentaenoic acid from pilchard	19	4.12
Cookery		
How to cook halibut	29	2.8
Crab		
Frozen whole crab	9	3.235
Dried and dehydrated fish		
Freeze-dried shrimp	17	3.63
Economics and statistics		
Fishing tariff concessions	23	9.2
European fisheries, Scandinavia		
Danish fishery research	25	1.0141
Factoryships		
Freezing whole lobsters	5	2.118
Fish meal, nutritive value		
Fish meal manufacture	19	6.190
Calorie-protein ratio	19	6.190
Fish meal and oil, manufacture		
Processing sea lions	1	1.95
Tuna viscera in solubles	19	6.15
Solvent extraction of meal	29	6.132
New viscera meal	29	6.132
Extraction of liver oil	29	6.133
Food technology		
Fresh fish handling research	25	0.6
Freshness of fish		
Fish freshness tests	23	7.80
Frozen fish, packaging		
Antioxidants for paperboard	13	3.238
Packaging frozen food	15	3.238
Frozen fish, processing		
Cold-storage design and equipment	7	3.23
Quality of frozen dinners	9	3.235
Breaded shrimp production	9	3.236
Consumer preference study	11	3.236
New fish stick line	11	3.237
Pacific cod fish sticks	11	3.237
Fish stick standards	11	3.237
Variables in fish-stick quality	13	3.237
Frozen fish fillet blocks	13	3.237
Breading for fish sticks	13	3.237
Gear, fishing		
Dredge trawl fishery	1	2.1121
Synthetic fiber gear	3	2.112
A fish corral	3	2.1124
Sled-type scallop dredge	3	2.1128
Dungeness crab pots	3	2.1128
Properties of synthetic cords	27	2.111
Net tapering	27	2.111
Durability of net threads	27	2.111
Purse seine experiments	29	2.1125
Handling fresh fish		
Changes in iced fish	7	2.19
Air conditioned oysters	9	2.2
Marine plant products		
Seaweed colloids	21	6.3
Alginate from rockweed	21	6.3
Eel grass insulation	21	6.3
Marketing		
Trucks for frozen foods	15	3.26
Nutritional value of fish and toxicity		
Toxicity of schizothorax species	29	2.9
Histamine poisoning from fish	29	2.9
Preserved fish, miscellaneous		
Food irradiation problems	7	3.19
Radiation preservation	7	3.19
Preservatives and sanitation		
Quality control of food	23	8.8
Rancidity		
Color of whale oil	29	4.5
Salt fish		
Machine salted pilchards	15	3.5
Shrimp		
Trawling for shrimps	1	1.85
Smoked fish		
Fireless smoke generator	17	3.4
Smoked salmon from Torry kiln	17	3.4
Spoilage		
Effect of autolysis on putrefaction	27	2.00
ATPase action of carp myosin	27	2.02
Transportation		
Transporting fresh crab meat	5	2.5
Truck refrigeration	15	3.26
Vessels, fishing		
Loading bait	5	2.115
Hydroconic trawler hulls	5	2.115

2.1124 CONDITION OF THE MIDDLE ATLANTIC POUND-NET FISHERY

June, Fred C.
Commercial Fisheries Review 18, 1-5 (April 1956)

(Abstract of this article appears under 1.0116 page 1 - December 1956)

2.1125 MODEL EXPERIMENTS ON THE SARDINE PURSE SEINE OPERATING IN HUYGANADA III.

Iitaka, Yunosuke
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 7, 459-462 (1955) (English abstract, figures, and plates)

When the bottom margin of the net has sunk completely the tension of the purse line begins to act as soon as the pursing begins. When the bottom margin of the net is sinking it does not act until the first 1/6 stage of the pursing procedure is finised, and then it increases sharply.

2.19 SPOILAGE OF FISH IN THE VESSELS AT SEA. 2. TREATMENT ON THE DECK AND IN THE HOLD

Castell, C. H.; MacCallum, W. A.; and Power, H. E.
Journal of the Fisheries Research Board of Canada 13, 21-39 (January 1956)

(Abstract of this article appears under 2.15 page 5 - October 1956)

2.8 HOW TO COOK HALIBUT

Osterhaug, Kathryn L. and Kerr, Rose G. (United States Fish and Wildlife Service, Seattle, Washington, and College Park, Maryland)
Fish and Wildlife Service, Test Kitchen Series No. 9, 10 pp. (1956)

Contains 25 tested recipes for use with fresh and frozen halibut.
For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 20 cents.

2.9 STUDIES ON PUTREFACTION OF AQUATIC PRODUCTS

Simidu, Wataru and Hibiki, Sigeyuki
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 5, 357-367 (1955) (English abstract, figures, and tables)

XXI. Consideration on difference in putrefaction for various kinds of fish. (4) on difference of concentration of histidine between the interior and the exterior of cells.
XXII. On poisoning of spoiled fish.
XXIII. On the critical concentration of poisoning for histamine.

2.9 THE TOXICITY OF SCHIZOTHORAX SPECIES. THE USE OF THEIR ROE AND FAT AS FOOD

Kostin, I. A.
Voprosy Ikhtiologu 1953, No. 1, 109-14; Referat. Zhur. Khim., Biol. Khim (1955) No. 8746
Chemical Abstracts 50, 6700 (May 10, 1956)

4.5 STUDIES ON THE PIGMENTS OF WHALE OIL X. RELATION BETWEEN COLORATION OF OIL AND DEGRADATION OF THE HEMIN ADDED TO THE ORIGINAL OIL

Mukai, Katsunori
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 8, 921-924 (1953) (English abstract and tables)

The color of whale oil is related to the amount of peroxides contained in the oil. If the oil contains large quantities of peroxides, the color of the oil becomes more pronounced than that of low peroxide value oils.

4.61 THE PROTECTION METHOD OF MARINE PRODUCTS FROM THEIR DETERIORATION DUE TO THE OXIDATION OF OIL

Toyama, Kenzo and Saruya, Kuman
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 4, 248-252 (1955) (English abstract, figure, and tables)

IV. Application of some antioxidants to salting of salmon.--Antioxidants such as butylated hydroxyanisole (B.H.A.), ethyl protocatechuate (E.P.), and propyl gallate (P.G.) were mixed with common salt used for salting salmon. B.H.A. was found to be almost satisfactory after the salmon had been stored for 3 and 6 months, whereas E.P. and P.G. were less effective.

6.132 NEW 'SUPER' FISH MEAL

Anonymous
Canadian Fisherman 43, 29 (March 1956)

6.132 SOLVENT EXTRACTION PROCESS CUTS RESIDUAL OIL IN MEALS DOWN TO 0.5 PERCENT

Anonymous
Chemical Processing 19, 71 (June 1956)

Heart of process is horizontal, total-submergence, counter-flow extractor.

6.133 EXTRACTION OF HIGH-POTENCY LIVER OIL FROM LIVERS OF LOW OIL CONTENT

Maruyama, Tsutomu and Kikuchi, Jiro (Taiyo Fisheries Co.)
Japan 7587 (1954)
Chemical Abstracts 50, 5247 (April 10, 1956)

INT.-DUP. SEC., WASH., D.C 9879

United States
Department of the Interior
Fish and Wildlife Service
Washington 25, D. C.

Official Business